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EPA Chemical Profiles

for

Extremely Hazardous Substances

U.S. Environmental Protection Agency

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EPA CHEMICAL PROFILES
INTRODUCTORY INFORMATION AND FULL PROFILES

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June 1988

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* Chemical Abstracts Service Registry Number.

EPA CHEMICAL PROFILES: INTRODUCTORY INFORMATION

BACKGROUND

The U.S. Environmental Protection Agency has developed a set of chemical profile reference documents for use in dealing with Section 302 of Title III of the Superfund Amendments and Reauthorization Act (SARA). These EPA profiles contain a summary of publicly available documented information for chemicals on the EPA list of extremely hazardous substances listed in the Federal Register, Vol. 52, No. 77, April 22, 1987.

The profiles were originally developed in 1985 for the 402 chemicals then called "acutely toxic chemicals" under the Chemical Emergency Preparedness Program. When the list went into law as the list of extremely hazardous substances, four additional chemicals were included. Forty of the 406 chemicals were subsequently deleted from the list. Profiles are provided for the 366 chemicals listed in February, 1988, as extremely hazardous substances. Other chemicals may be added or deleted in the future. The profile format was revised and the data were reviewed, augmented, and revised as appropriate in 1987. The profiles have been reviewed for accuracy and completeness. However, an exhaustive literature search was not performed for each chemical, and a review of original citations has not been made.

A profile is provided for each chemical on the list of extremely hazardous substances. Profiles are presented in ascending order of Chemical Abstract Service (CAS) registry numbers. One chemical (generic name: organorhodium complex) is identified by a premanufacture review notice (PMN) number and appears first.

The CAS number was used to search the automated Toxicology Data Base (TDB) or Hazardous Substance Data Bank (HSDB) from the National Library of Medicine (NLM). If available, TDB/HSDB files were retrieved. Approximately 65 percent of the chemicals were listed in the TDB/HSDB files. For these chemicals, the TDB/HSDB files provided the main source of information for the profiles. All data obtained from the TDB/HSDB were indicated by an asterisk (*) followed by a reference to the TDB/HSDB citation, (e.g., (*Merck 1976)). For those chemicals without a TDB/HSDB file, a limited number of standard reference materials was searched. Such references are cited by author, year, and page number. A master list of references, including the secondary references cited in TDB/HSDB, has been prepared and may be found in the Reference Section of this document. The abbreviations used in the profiles have been defined in a master list and may be found in the Abbreviation Section. Medical terms not commonly used have been included in a Glossary Section. Dorland's Medical Dictionary (1974) was used to provide most of the definitions in the Glossary.

If information was not available for a specific compound but the chemical could be categorized, then general information about the chemical category was included. Such information is indicated, for example, by the notation "Non-Specific -- Organophosphorus Pesticide" or "Non-Specific -- Poisonous Solid, n.o.s.".

DISCUSSION OF SECTIONS OF PROFILES

Each profile includes chemical identity information and eight sections containing information on regulations, properties, hazards, uses, and precautions. Comments on the elements of the profiles are presented below.

Chemical Identity. The name given on the profile is the name used on the list of extremely hazardous substances (Section 302 of SARA Title III) and is one of the most common names.

CAS Registry Number. The number is identical to the number listed in the National Institute of Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS).

Synonyms. Synonyms from TDB/HSDB files are listed without citation. Synonyms from NIOSH/RTECS (1983) or the Structure and Nomenclature Search System (SANSS) (1983), or other sources are referenced. The 9th Collective Index (CI) name from the SANSS 1983 database was added to each profile when the 9th CI name was different from the 8th CI name.

Chemical Formula and Molecular Weight. Data from TDB/HSDB or NIOSH/RTECS (1983) are not cited. Formulas or molecular weights found in other sources are cited.

Section I -- Regulatory Information. The toxicity value that placed the chemicals on the list has been included in this section. These toxicity data were obtained from a screen of the NIOSH/RTECS on-line computer file and are also cited with an asterisk (*) (e.g., *NIOSH/RTECS 1985). Toxicity data were not included for chemicals listed on the basis of high production volume and known toxicity ("Other" chemicals).

Also included are Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs), as listed in the Final Rule (Federal Register, Volume 52, Number 77, April 22, 1987).

An indication of whether the chemical is listed under Section 313 of Title III of SARA is included; if the chemical falls into a chemical category listed in Section 313, the category is given.

Section II -- Physical/Chemical Characteristics. Physical state (solid, liquid, or gas) at ambient conditions is listed, as given in the Interim Final Rule (Federal Register, Vol. 51, No. 221, November 17, 1986); no reference is cited on the profiles. Other properties are included with references.

Section III -- Health Hazard Data. Generally, only human data are reported in the Health Hazard Data section. The following exposure limits are included, if available:

- Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs);
- American Council of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs); and

- Immediately Dangerous to Life and Health (IDLH) levels developed by NIOSH.

The following limits may be listed under Other Limits Recommended, if available:

- NIOSH recommendations;
- EEGLs (emergency exposure guidance levels);
- SPEGLs (short-term public emergency guidance levels);
- Human carcinogens or suspect carcinogens listed by the ACGIH;
- OSHA carcinogens; and
- NIOSH potential occupational carcinogens.

EEGLs and SPEGLs, developed by the National Research Council of the National Academy of Sciences, are discussed in more detail in Appendix D of the Technical Guidance for Hazards Analysis (EPA 1987). An EEGL is defined as an acceptable concentration for unpredicted, single, short-term emergency exposure of a defined occupational group (EEGLs have been developed for military personnel). A SPEGL is defined as an acceptable concentration for unpredicted, single, short-term, exposure of the general public in emergencies.

Information on the route of exposure and health hazards often was not available or only partially available for specific chemicals. Health hazard data often were not found specific to dose, route of entry or exposure type (acute, delayed, or chronic). Generic information on the chemical category was provided, wherever possible, in the absence of information on the specific chemical.

Section IV -- Fire and Explosion Hazard Data. In the absence of chemical-specific information, generic information is provided whenever the chemical could be categorized. National Fire Protection Association (NFPA) flammability ratings from the NFPA Fire Protection Guide on Hazardous Materials are included if available.

Section V -- Reactivity Data. In the absence of chemical-specific information, generic information is provided whenever the chemical could be categorized.

Section VI -- Use Information. This section includes uses of the chemical as reported in HSDB or other sources.

Section VII -- Precautions for Safe Handling and Use. Chemical-specific information often was not available; therefore, generic information for the chemical category often is presented.

Section VIII -- Protective Equipment for Emergency Situations. This section contains recommendations for the type of personal protective equipment to be used. See page 5 for a detailed discussion of personal protective equipment.

Section IX -- Emergency Treatment Information. This section contains information on signs and symptoms of poisoning and emergency treatment information for first responders. Emergency planners may be especially

interested in references to medical equipment and supplies that could be useful in case of the accidental release of the extremely hazardous substance.

Approximately 120 of the revised chemical profiles contain complete revisions of the emergency treatment information section and have been retitled the Emergency First Aid Treatment Guide (EFATG). This new section has been reformatted and contains more detailed guidance for emergency treatment based on information obtained from the Rocky Mountain Poison Center's proprietary data base, Poisindex. The order of completion of EFATG's is being carried out by priority based on considerations of toxicity, production volume, and availability of specific emergency treatment information. Revisions of the emergency treatment information sections for the remaining profiles is underway and will be published as soon as they are completed. In the meantime, these profiles contain the emergency treatment information that was originally published in 1986.

Because the emergency treatment information is designed for use by first responders, references to signs and symptoms of exposure as well as procedural guidance avoid the use of highly technical medical language. Signs and symptoms are not distinguished by route of exposure. Emergency treatment procedures, on the other hand, are presented according to route of exposure, with emphasis on the inhalation and dermal routes. References to invasive treatments are limited, since the emergency treatment information is directed to first responders rather than medical practitioners. First responders must be aware of particular state and local regulations which govern the extent of invasive treatment that they may perform.

The Agency for Toxic substances and Disease Registry (ATSDR) has provided general review of the EFATG's for format and content.

Comments. This section is provided, in some cases, to list the sources that were checked for information in cases of chemicals for which few data were available. In general, this section pertains to chemicals without TDB/HSDB files.

Not Found. This statement on the profile can mean that:

- The value or information was not found in the references used;
- The value or information probably does not exist for this chemical; or
- The value is meaningless or not applicable for this chemical.

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) for emergency response situations involving extremely hazardous substances must be selected carefully and used properly. The PPE should protect the respiratory system, skin, eyes, face, hands, feet and body from chemical, physical and biological hazards that may be encountered during an emergency response action. Selection of the proper personal protective equipment must consider the specific hazards responders are likely to encounter at a particular site. Selection is a complex task and should be performed only by individuals with proper training and experience.

Regulatory Requirements and Other Standards. Selection, use, training and programs for PPE for emergency response situations may be covered by regulations and standards under the Occupational Safety and Health Administration (OSHA) 29 CFR 1910, Environmental Protection Agency (EPA) regulations and recommendations, Department of Transportation (DOT) regulations, or National Fire Protection Association (NFPA) standards.

Personal Protective Equipment for Emergencies. During an emergency involving extremely hazardous substances, a wide variety of conditions may occur. Therefore, response personnel should wear maximum protection initially until actual conditions at the site are evaluated. Maximum protection is designed to provide the highest available level of respiratory, skin and eye protection. Recommended equipment consists of a positive pressure, pressure-demand full facepiece self-contained breathing apparatus (SCBA) or full facepiece supplied air respirator with escape SCBA and a fully-encapsulating chemical-resistant suit. In addition, other equipment such as inner chemical-resistant gloves, chemical-resistant safety boots/shoes, and two-way radio communications, a cooling unit, coveralls, long cotton underwear, hard hat, disposable gloves and boot covers may be worn as needed.

Figure 1 gives an example of a worker outfitted in a fully-encapsulating suit with respiratory protection. Note that if the fully-encapsulating suit does not have integral gloves and boots, then glove/suit and boot/suit joints should be sealed with tape.

Respiratory Protection. Positive pressure self-contained breathing apparatus (SCBA) should be worn by employees engaged in emergency response and exposed to hazardous substances until it is determined that a decreased level of respiratory protection will not result in hazardous exposures to employees (See OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response).

Chemical Protective Clothing and Equipment. The selection of chemical protective clothing is a complex process and many factors must be considered such as: the nature of the hazard; the potential route of exposure; the tasks to be accomplished; and the performance of the protective equipment materials in forming a barrier to the chemical substances encountered at a site. No protective equipment material protects against all chemicals and combinations of chemicals. In many cases, the chemical substance may permeate or break through the protective equipment material, exposing the wearer to the chemical. It is important to note that the information

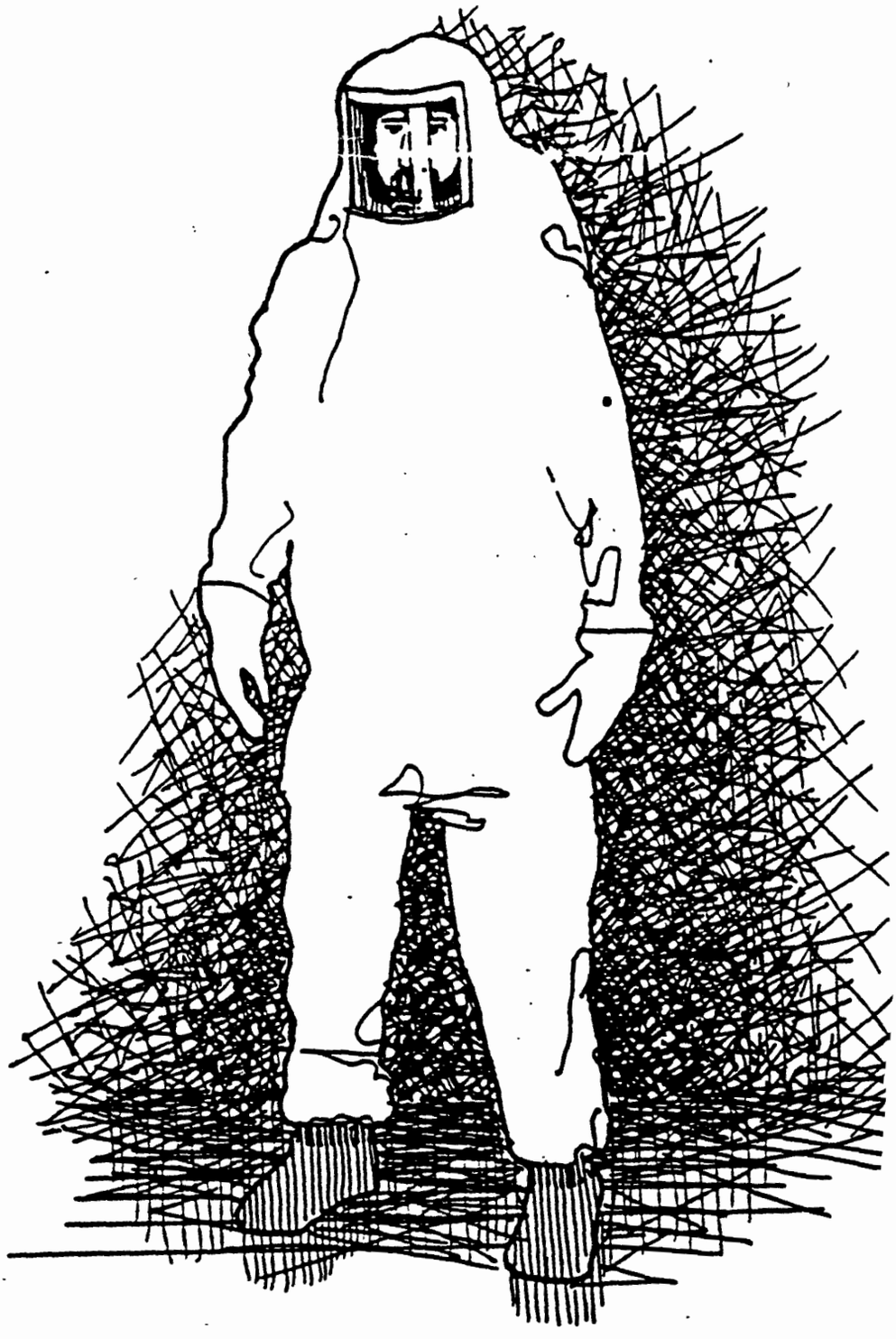

Figure 1. FULLY ENCAPSULATING CHEMICAL-RESISTANT SUI
Respiratory Protection Must be Worn with this Type of S

From "Guidelines for the Selection of Chemical Protective C
3rd Edition.

presented for an individual chemical may not be applicable when that chemical is present in a mixture, as the ability of a chemical in a mixture to permeate a material may differ from that of the pure chemical. Further studies are needed to evaluate the characteristics of mixtures of chemicals in relation to materials for personal protective equipment.

The chemical profiles give general information on the chemical resistance of various suit materials to provide a basis for a decision on whether suit materials are adequate. This information is available for about half of the chemicals on the list of extremely hazardous substances. The chemical resistance information for each suit material is indicated on the profiles by the entries shown below. Explanations of their meanings follow the entries.

- Excellent Resistance/Many Data means there is quantitative information indicating that the material demonstrates excellent chemical resistance to the substance.

- Good Resistance/Limited Data means there is quantitative information indicating that the material demonstrates good chemical resistance to the substance.

- Poor Resistance/Many Data means there is quantitative information indicating that the material demonstrates poor chemical resistance to the substance.

- Poor Resistance/Limited Data means there is quantitative information indicating that the material demonstrates poor chemical resistance to the substance.

- Good Resistance/Limited Data* means there is qualitative information indicating that the material demonstrates good chemical resistance to the substance. Most of this information is based on qualitative ratings from glove material manufacturers and may or may not be based on actual testing. This entry on the profile is intended to provide general guidance in selecting chemical protective clothing.

- Poor Resistance/Limited Data* means there is qualitative information indicating that the material demonstrates poor chemical resistance to the substance. Most of this information is based on qualitative ratings from glove material manufacturers and may or may not be based on actual testing. This entry on the profile is intended to provide general guidance in selecting chemical protective clothing.

- Good Resistance/Limited Data** means there is qualitative or quantitative information indicating that the material demonstrates good chemical resistance based on the generic family of chemicals to which the substance belongs. Most of this information is not based on testing done on the substance itself. This entry on the profile is intended to provide general guidance to the initial selection of chemical protective clothing and to narrow the scope of alternative materials.

- Poor Resistance/Limited Data** means there is qualitative or quantitative information indicating that the material demonstrates poor chemical resistance based on the generic family of chemicals to which the substance belongs. Most of this information is not based on testing done on the substance itself. This entry on the profile is intended to provide general guidance to the initial selection of chemical protective clothing and to narrow the scope of alternative materials.

Remember that this information provides guidance only and is not a guarantee that the suit will protect an individual from prolonged or repeated exposure and may not provide adequate protection for mixtures of chemicals. Consult reference 1 for more information. Also, be sure to consult with facility representatives for additional information. Other considerations include durability and flexibility of the chemical protective clothing, and heat stress. Table 1 lists the fully-encapsulating suit materials available on the market as of February, 1987. (See non-mandatory Appendix B of OSHA 29 CFR 1910.120 for more information).

Special Use Considerations. Fire, heat, explosion and radiation require special-protective equipment. It is important to provide protection from these hazards in addition to chemical hazards. Section IV of the profiles entitled Fire and Explosion Hazard Data should be consulted for further information. (See OSHA 29 CFR 1910.156, DOT and NFPA standards and recommendations for more information.)

Decontamination. Decontamination of personal protective equipment should be tailored to the specific conditions at the site and will vary accordingly. (See non-mandatory Appendix D of OSHA 29 CFR 1910.120 for additional information).

TABLE 1. AVAILABLE FULLY-ENCAPSULATING SUIT MATERIALS
AS OF FEBRUARY, 1987*

1. Butyl Rubber/Nylon (BUTYL)
2. Butyl Rubber, Sheet (BUTYL)
3. Butyl/Fabric/Butyl (BUTYL)
4. Butyl/Nylon/Butyl (BUTYL)
5. Butyl/Polyester/Chloroprene Rubber (BUTYL/NEOPRENE)
6. Chlorinated Polyethylene (CPE)
7. Chlorobutyl Rubber/Nomex (CHLOROBUTYL)
8. Chlorobutyl/Nomex/Chlorobutyl (CHLOROBUTYL)
9. Chloroprene Rubber/Nylon (NEOPRENE)
10. Chloroprene Rubber, Sheet (NEOPRENE)
11. Fluoroelastomer/Butyl/Nylon/Butyl (VITON/BUTYL)
12. Fluoroelastomer/Fabric/Fluoroelastomer (VITON)
13. Fluoroelastomer/Nylon/Chloroprene (VITON/NEOPRENE)
14. Fluoroelastomer/Polyester/Chlorobutyl (VITON/CHLOROBUTYL)
15. Fluoroelastomer, Sheet (VITON)
16. Nitrile/Fabric (NITRILE)
17. PE/Polyvinylidenechloride/PE/Tyvek (SARANEX)
18. Polyethylene/Tyvek (PE)
19. Polyvinyl Chloride/Fabric (PVC)
20. Polyvinyl Chloride/Fabric/Polyvinyl Chloride (PVC)
21. Polyvinyl Chloride/Nylon (PVC)
22. Polyvinyl Chloride/Nylon/Polyvinyl Chloride (PVC)
23. Polyvinyl Chloride, Sheet (PVC)
24. Sontara (NONWOVEN FABRIC)
25. TFE/Fiberglass/TFE (TEFLON)
26. TFE/Nomex/TFE (TEFLON)
27. Tyvek (NONWOVEN PE)

* Schwope, A.D., et al. Guidelines for the Selection of Chemical Protective Clothing, 3rd Edition. Cincinnati: American Conference of Governmental Industrial Hygienists, Inc., 1987.

PERSONAL PROTECTIVE EQUIPMENT REFERENCES

1. Schwope, A.D.; P.P. Costas; J.O. Jackson; J.O. Stull; and D.J. Weitzman. Guidelines for the Selection of Chemical Protective Clothing. 3rd Edition. Cincinnati: American Conference of Governmental Industrial Hygienists, Inc., 1987.

2. Certified Equipment List as of October 1, 1986. DHHS (NIOSH) No. 87-102. Cincinnati: National Institute for Occupational Safety and Health, 1986.

3. Criteria for a Recommended Standard ... Occupational Exposure to Hot Environments Revised Criteria 1986. DHHS (NIOSH) No. 86-113. Cincinnati: National Institute for Occupational Safety and Health, 1986.

4. National Institute for Occupational Safety and Health; Occupational Safety and Health Administration; U.S. Coast Guard; U.S. Environmental Protection Agency. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. DHHS Occupational Safety and Health, 1985.

5. Occupational Safety and Health Administration 29 CFR 1910 Occupational Safety and Health Standards, especially 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response.

6. National Fire Protection Association standards and recommendations, such as NFPA 704M, 1500 and 1981.

ABBREVIATIONS

ACGIH	--	American Conference of Government and Industrial Hygienists
ADI	--	Acceptable Daily Intake
AIHA	--	American Industrial Health Association
BAL	--	Dimercaprol (British anti-lewisite)
CAS	--	Chemical Abstracts Service
CC	--	Closed cup
CNS	--	Central Nervous System
EEG	--	Electroencephalogram
EEGL	--	Emergency Exposure Guidance Level developed by the National Research Council (NRC)
EKG	--	Electrocardiogram
EPA	--	Environmental Protection Agency
IARC	--	International Agency for Research on Cancer
IDLH	--	Immediately Dangerous to Life and Health
im	--	intramuscularly
LCLO	--	Lethal Concentration Low; the lowest concentration at which death occurred
LC50	--	Lethal Concentration 50; the concentration at which 50% of the animals died; a calculated value
LDLO	--	Lethal Dose Low; the lowest dose at which death occurred
LD50	--	Lethal Dose 50; the dose at which 50% of the animals died; a calculated value
LEL	--	Lower Explosive Limit
m^3	--	Cubic meter
mg/Kg	--	milligrams per kilogram
mmHg	--	millimeters of mercury; a measure of pressure
NIOSH	--	National Institute of Occupational Safety and Health
n.o.s.	--	Not otherwise specified

ABBREVIATIONS (Cont'd)

NRC	--	National Research Council, National Academy of Sciences
NTP	--	National Toxicology Program
OC	--	open cup
OSHA	--	Occupational Safety and Health Administration
PEL	--	Permissible Exposure Level
ppb	--	parts per billion
ppm	--	parts per million
RBC	--	Red blood cell(s)
RTECS	--	Registry of Toxic Effects of Chemical Substances
SANSS	--	Structure and Nomenclature Search System
SPEGL	--	Short-term Public Exposure Guidance Level developed by the NRC
STEL	--	Short-term exposure limit
TCC	--	Tagliabue Closed Cup, a standard method of determining flash point
TOC	--	Tagliabue Open Cup, a standard method of determining flash point
TDLO	--	Toxic Dose Low; the lowest dose at which toxicity occurred
TLV	--	Threshold Limit Value
TWA	--	Time Weighted Average
UEL	--	Upper Explosive Limit
ug	--	microgram
2-PAM	--	pralidoxime

GLOSSARY

Acaricide -- an agent that destroys mites

Acidosis -- pathologic condition resulting from accumulation of acid in, or loss of base from, the blood or body tissues

Acneform -- resembling acne

Albuminuria -- presence of serum albumin in the urine

Alopecia -- baldness; absence of hair from skin areas where it is usually present

Amorphous -- without definite form, not crystallized

Anaphylactoid -- resembling an unusual or exaggerated allergic reaction to foreign protein or other substances

Anorexia -- lack or loss of appetite for food

Anoxia -- absence of lack of oxygen; reduction of oxygen in the body tissues below physiologic levels

Anthelmintic -- an agent that is destructive to worms especially of the intestine

Anticoagulant -- an agent that prevents blood clotting

Antilewisite -- dimercaprol; also called British anti-lewisite, or BAL

Antimetabolite -- a substance that interferes with utilization of an essential metabolite

Antipyretic -- an agent that relieves or reduces fever

Aphasia -- defect or loss of power of expression by or comprehension of speech, writing, or signs

Aplasia -- lack of development of an organ or tissue, or the cellular products from an organ or tissue; germinal aplasia -- complete failure of gonad development

Argyrosis -- poisoning by silver or a silver salt, evidenced by ashen-gray discoloration of skin

GLOSSARY (Cont'd)

Arrhythmia	--	any variation from the normal rhythm of the heart beat
Arteriosclerosis	--	hardening and thickening of the walls of the smaller arteries
Asthenia	--	lack or loss of strength; weakness
Astringent	--	causing contraction, usually locally after surface application
Ataxis	--	failure of muscular coordination; irregularity of muscular action
Avicide	--	an agent that kills birds
Bioaccumulation	--	increased concentrations of a chemical in an organism compared to the surrounding environment
Bradycardia	--	slowness of the heart beat, as evidenced by slowing of pulse rate to less than 60
Bronchoconstriction	--	narrowing of the air passages of the lungs
Calcification	--	process by which organic tissue becomes hardened by a deposit of calcium salts within its substance
Carcinogenic	--	producing or inciting cancer
Cardiac	--	pertaining to the heart
Cathartic	--	causing evacuation of the bowels; laxative
Cheyne-Stokes respiration	--	respiratory distress related to posture (especially reclining at night) that occurs in association with heart disease
Chloracne	--	acne-like eruption caused by exposure to chlorine compounds
Clonic	--	pertaining to alternate muscular contraction and relaxation in rapid succession
Conjunctivitis	--	inflammation of the lining of the eyelids
Contraindication	--	any condition which renders some particular line of treatment improper or undesirable

GLOSSARY (Cont'd)

Cryogenic	--	pertaining to or causing the production of low temperatures
Cyanosis	--	bluish discoloration, especially of the skin and mucous membranes and fingernail beds
Decoction	--	substance prepared by boiling
Demulcent	--	soothing
Dermal	--	pertaining to the skin
Dermatitis	--	inflammation of the skin
Desiccant	--	a drying agent
Diluent	--	a diluting agent
Diuresis	--	increased secretion of urine
Diuretic	--	agent that increases urine production
DS2	--	standard decontaminant for chemical warfare agents; contains 70% diethylene triamine, 28% ethylene glycol monomethyl ether, and 2% sodium hydroxide
Ductile	--	capable of being drawn out or hammered thin
Dyspnea	--	difficult or labored breathing
Ectoparasiticide	--	an agent that kills parasites living on the exterior of its host
Edema	--	presence of abnormally large amounts of fluid in intercellular spaces of body tissues
Emesis	--	vomiting
Enteritis	--	inflammation of the intestine
Epigastric	--	pertaining to the upper-middle region of the abdomen
Epileptiform	--	occurring in severe or sudden spasms
Epithelium	--	cells covering the internal and external surfaces of the body

GLOSSARY (Cont'd)

Erythema	--	redness of the skin produced by congestion of the capillaries
Exothermic	--	characterized by or formed with evolution of heat
Explosive	--	characterized by or relating to bursting forth with sudden violence or noise from internal energy; relating to a rapid reaction with production of noise, heat, and violent expansion of gases
Flammable	--	capable of being easily ignited and supporting combustion
Gastrointestinal	--	pertaining to the stomach and intestine
Germinalaplasia	--	lack of development of egg and sperm cells
Glomerular	--	pertaining to a tuft or cluster, as of blood vessels or nerve fibers
Half-life	--	the time in which the concentration of a substance will be reduced by half
Halon	--	halogenated hydrocarbon (e.g., carbon tetrachloride)
Health Hazard		
Acute	--	immediate toxic effects
Chronic	--	persistent or prolonged injury
Delayed	--	toxic effect occurring after a lapse of time
Hematoma	--	localized collection of blood, usually clotted, in an organ, space, or tissue, due to a break in the wall of the blood vessel
Hematuria	--	blood in the urine
Hemoglobinuria	--	presence of free hemoglobin in the urine
Hemolysis	--	separation of hemoglobin from red blood cells and its appearance in the plasma
Hemolytic	--	pertaining to or characterized by hemolysis
Hepatic	--	pertaining to the liver

GLOSSARY (Cont'd)

Humectant	--	moistening or diluent substance
Hydrolysis	--	decomposition reaction involving the splitting of a chemical substance by water
Hygroscopic	--	readily taking up and retaining moisture (water)
Hyperactivity	--	abnormally increased activity
Hyperalimentation	--	ingestion or administration of a greater than optimal amount of nutrients
Hyperbilirubinemia	--	an excess of bilirubin in the blood
Hypercalcemia	--	excess of calcium in the blood
Hyperparathyroidism	--	abnormally increased activity of the parathyroid glands which affects and is affected by serum calcium levels
Hyperpyrexia	--	a highly elevated body temperature
Hyperreflexia	--	exaggeration of reflexes
Hypersalivation	--	excessive secretion of saliva
Hypertension	--	persistently high arterial blood pressure
Hypervitaminosis	--	condition due to ingestion of an excess of one or more vitamins
Hypobilirubinemia	--	abnormally low levels of bilirubin in the blood
Hypocalcemia	--	abnormal reduction of blood calcium levels
Hypovolemic	--	pertaining to an abnormally decreased volume of circulating fluid (plasma) in the body
Hypoxemia	--	deficient oxygenation of the blood
Hypoxia	--	low oxygen content or tension; deficiency of oxygen in the inspired air
Interstitial Pneumonia	--	a chronic form of pneumonia with increase of the interstitial tissue and decrease of the proper lung tissue

GLOSSARY (Cont'd)

Isotonia	--	a solution having the same effective osmotic pressure as the body fluid to which it is compared
Jaundice	--	syndrome characterized by hyperbilirubinemia and deposition of bile pigment in the skin, resulting in yellow appearance of the patient
Lachrymator (or lacrimator)	--	a substance which increases the flow of tears
Lacrimation	--	secretion and discharge of tears
Laryngospasm	--	spasmodic closure of the larynx
Larynx	--	the muscular and cartilage structure situated at the top of the trachea (windpipe) and below the root of the tongue, functioning as sphincter into the trachea and as the organ of voice
Lassitude	--	weakness; exhaustion
Latency	--	a state of seeming inactivity
Lesion	--	a pathological or traumatic discontinuity of tissue or loss of function of a part
Lethal	--	deadly; fatal
Leukopenia	--	reduction in the number of leukocytes in the blood
Lewisite	--	a lethal war gas which is a vesicant, lacrimator and lung irritant
Malaise	--	a vague feeling of bodily discomfort
Mania	--	a phase of mental disorder characterized by an expansive emotional state, elation, overtalkativeness, and increased motor activity
Metastatic	--	pertaining to the transfer of disease from one organ or part to another not directly connected with it
Methemoglobinemia	--	presence of methemoglobin (oxidized hemoglobin) in the blood
Miosis (or myosis)	--	contraction of the pupil

GLOSSARY (Cont'd)

Miscible	--	capable of mixing in any ratio without separation of two phases
Mordant	--	a chemical that fixes a dye in or on a substance by combining with the dye to form an insoluble compound
Mutagenic	--	inducing genetic mutation
Mydriasis	--	extreme dilation of the pupil
Myelosuppression	--	suppression of the formation of bone marrow
Narcotic	--	an agent that produces insensibility or stupor
Necrosis	--	death of tissue, usually as individual cells, group of cells, or in localized areas
Nephritis	--	inflammation of the kidney
Neural	--	pertaining to a nerve or to the nerves
Neuropathy	--	functional disturbances and/or pathological changes in the peripheral nervous system
Neurotoxicity	--	exerting a destructive or poisonous effect on nerve tissue
Nocturia	--	excessive urination at night
Ocular	--	pertaining to or affecting the eye
Oliguria	--	secretion of a diminished amount of urine in relation to fluid intake
Ophthalmic	--	pertaining to the eye
Osteosclerosis	--	hardening or abnormal density of bone
Palpitation	--	unduly rapid heart beat which is noted by the patient; it may be regular or irregular
Parasympathomimetic	--	producing effects resembling time of stimulation of the parasympathetic nerve supply to a part; called also cholinergic

GLOSSARY (Cont'd)

Parenteral	--	not through the alimentary canal but rather by injection through some other route, such as subcutaneous, intramuscular, intravenous, etc.
Paresthesia	--	an abnormal sensation, as burning or prickling
Perfusion	--	liquid poured over or through an organ or tissue
Pharynx	--	the muscular membrane sac between the mouth and nostrils and the esophagus
Photophobia	--	abnormal visual intolerance of light
Photosensitize	--	to induce a state of abnormal responsiveness to the influence of light
Phytotoxic	--	poisonous to plants; inhibiting plant growth
Polydipsia	--	excessive thirst persisting for long periods of time
Precordial	--	pertaining to the region over the heart and lower part of the thorax
Proteinuria	--	an excess of serum proteins in the urine; also called albuminuria
Psychosis	--	any major mental disorder characterized by derangement of the personality and loss of contact with reality
Psychotropic	--	exerting an effect upon the mind; capable of modifying mental activity
Pulmonary	--	pertaining to the lungs
Rales	--	abnormal respiratory sound heard when listening for sounds within the body
Recumbent	--	lying down
Renal	--	pertaining to the kidney
Scotoma	--	an area of depressed vision within the visual field, surrounded by an area of less depressed or normal vision

GLOSSARY (Cont'd)

Supertropical Bleach	--	bleaching agent containing calcium hypochlorite (a powerful oxidizer) and calcium oxide (a corrosive material)
Systemic	--	pertaining to or affecting the body or organism as a whole
Tachycardia	--	excessively rapid heart beat
Tepid	--	moderately warm; lukewarm
Teratogenic	--	tending to produce anomalies of formation or development
Tetanic	--	pertaining to or of the nature of tetanus, a disease characterized by muscle spasm
Thrombocytopenia	--	decrease in the number of blood platelets
Tidal volume	--	amount of gas that is inhaled and exhaled during one respiratory cycle
Tinnitus	--	a noise in the ears, such as ringing, buzzing, roaring, clicking
Toxic	--	pertaining to, due to, or of the nature of a poison
Triglyceridemia	--	excess of triglycerides in the blood
Urticaria	--	a vascular reaction of the skin marked by the transient appearance of smooth, slightly elevated patches (wheals) which are redder or paler than the surrounding skin and often attended by severe itching
Vasodilation	--	dilation (expansion of a vessel, especially of arterioles leading to increased blood flow to a part
Ventricular fibrillation	--	irregular heart beat characterized by uncoordinated contractions of the ventricle
Vertigo	--	dizziness; an illusion of movement as if the external world were revolving around an individual or as if the individual were revolving in space
Vesicant	--	causing blisters

GLOSSARY (Cont'd)

Volatile	--	readily vaporizable at a relatively low temperature

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SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	EXCELLENT/MANY
Butyl/Neoprene	GOOD/LIMITED*
CPE	GOOD/LIMITED
Neoprene	POOR/MANY
Nitrile	POOR/MANY
PE	EXCELLENT/MANY
PVC	POOR/MANY
Teflon	POOR/LIMITED
Viton	EXCELLENT/MANY
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

NOTES: For concentrations <37% formaldehyde

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for FORMALDEHYDE

(50-00-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless gas or liquid below -20 degrees C (-6 degrees F).

Odor - Strong, pungent.

Commercial Form - Aqueous solution containing approximately 40% formaldehyde and 15% methanol.

Uses - Disinfectant, preservative, embalming fluid, treatment of grain smut, hardening agent, reducing agent, corrosion inhibitor, gold and silver recovery, textile manufacture.

Other Names - Formalin, formic aldehyde, Formol, Karsan, Lysoform, methanal, methyl aldehyde, methylene oxide, Morbicid, oxomethane, oxymethylene.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, sodium bicarbonate, dopamine, norepinephrine, levarterenol.

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Signs and Symptoms of Acute Formaldehyde Exposure:

Acute exposure to formaldehyde may result in irritation or burns to the skin, eyes, and mucous membranes; lacrimation (tearing); nausea; vomiting (may be bloody); abdominal pain; and diarrhea. Difficulty in breathing, cough, pneumonia, and pulmonary edema may occur. Sensitized people may experience asthmatic reactions, even when exposed briefly. Hypotension (low blood pressure) and hypothermia (reduced body temperature) may precede cardiovascular collapse. Lethargy, dizziness, convulsions, and coma may be noted. Nephritis (inflammation of the kidneys), hematuria (bloody urine), and liver toxicity have been reported.

Emergency Life-Support Procedures:

Acute exposure to formaldehyde may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to formaldehyde.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to formaldehyde.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

FORMALDEHYDE

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of formaldehyde is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of formaldehyde may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MITOMYCIN C

CAS Registry Number: 50-07-7

Synonyms: Ametycine; Mutamycin; NSC-26980; Azirino[2',3':3,4]pyrrolo [1,2-a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aR-(1a.alpha.,8.beta.,8a.alpha.,8b.alpha.)]-

Chemical Formula: $C_{15}H_{18}N_4O_5$

Molecular Weight: 334.37

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 14 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Above 680°F, 360°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Merck 1983)

Appearance and Odor: Blue-violet crystals (*Merck 1983)

MITOMYCIN C

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Toxic doses as low as 750 mg/kg have been reported in humans (*NIOSH 1979). The major toxic effect is myelosuppression, characterized by marked leukopenia and thrombocytopenia; this may be delayed and cumulative. Interstitial pneumonia and glomerular damage resulting in kidney failure are unusual but well documented complications (Gilman 1985, p. 1289).

Medical Conditions Generally Aggravated by Exposure: Lung conditions -- administration of mitomycin has been recognized as causing pneumonitis, alveolitis and pulmonary fibrosis (*Weiss 1980). Kidney conditions -- administration of mitomycin can cause kidney damage (Gilman 1985, p. 1289). Kidney toxicity was observed in 1-5 percent of patients. Depressed immune conditions (*AMA 1977).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

MITOMYCIN C

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Anti-tumor antibiotic complex (*Merck 1976). This drug is usually injected intravenously (*AMA 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact.

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Headaches, blurred vision, confusion, drowsiness, fatigue, diarrhea, and pain have been occasionally noted. These do not appear to be dose related by intravenous administration. Fever and anorexia occur in 15 percent of patients. Hair loss, sloughing of skin, and loss of feeling occur in approximately 4 percent of patients. Labored breathing, cough and pneumonia occur in some cases. Renal toxicity is sometimes observed (*AMA 1977).

Emergency and First Aid Procedures: Seek immediate medical care. Skin decontamination should be thorough, with water and soap. Eye exposure can be followed by irrigation of eyes with plain tap water (*Rumack 1975 to Present). (Non-Specific -- Medicines, n.o.s.) If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 11).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ERGOCALCIFEROL

CAS Registry Number: 50-14-6

Synonyms: 9,10-Secoergosta-5,7,10(19),22-Tetraen-3-beta-ol; 9,10-Secoergosta-5,7,10(19),22-Tetraen-3-ol,(3-beta,5Z,7E,22E)-; Activated Ergosterol; Buco-D; Calciferol; Calciferon 2; Condacaps; Condocaps; Condol; Crtron; Crystallina; D-Arthin; D-Tracetten; Daral; Davitamon D; Davitin; De-Rat Concentrate; Decaps; Dee-Osterol; Dee-Ron; Dee-Ronal; Dee-Roual; Deltalin; Deratol; Detalup; Diactol; Divit Urto; Doral; Drisdol; Ergorone; Ergosterol Activated; Ergosterol, Irradiated; Ertron; Fortodyl; Geltabs; Hi-Deratol; Infron; Irradiated Ergosta-5,7,22-Trien-3-Beta-ol; Irradiated Ergosterol; Metadee; Mina D2; Mulsiferol; Mykostin; Oleovitamin D; Oleovitamin D2; Ostelin; Radiostol; Radsterin; Shock-Ferol; Vitamin D2

Chemical Formula: $C_{28}H_{44}O$

Molecular Weight: 396.63

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (dog) 4 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 239-244°F, 115-118°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

ERGOCALCIFEROL

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble in water (*Merck 1976)

Appearance and Odor: White crystals, odorless (*Osol 1975)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Ergocalciferol poisoning disturbs calcium metabolism and causes kidney damage (Buchel 1983, p. 224). Ergocalciferol in a single acute ingestion presents no toxic hazards. Daily ingestion in excess of 5000 units/day in children or 7500 units/day in adults will produce toxic symptoms associated with hypervitaminosis D (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Those with hypercalcemia are at a greater risk (Physicians' Desk Reference 1985, p. 1748)

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Medicines, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 11).

Special Fire Fighting Procedures: (Non-Specific -- Medicines, n.o.s.) Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 11).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

ERGOCALCIFEROL

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Furia 1972)
Stable:

Conditions to Avoid: Shows signs of decomposition when stored for a few days at room temperature (*Furia 1972).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Nutrient and/or dietary supplement food additive (*Sax 1975).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Medicines, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 11).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Initial symptoms of ergocalciferol poisoning include anorexia, nausea and vomiting. It often mimics hyperparathyroidism with thirst, muscular weakness, nervousness, kidney impairment, hypertension (*Gosselin 1976), and excessive urination (*Gilman 1980).

ERGOCALCIFEROL

SECTION IX (continued)

Emergency and First Aid Procedures: (Non-Specific -- Medicines, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 11).

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SECTION IV (continued)

UEL: 73% (*Sax 1975)

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do so without risk. Do not get water inside container. Spray cooling water on containers exposed to flames until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Keep unnecessary people away; stay upwind; keep out of low areas. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (*DOT 1984). Wear self-contained breathing apparatus; wear goggles if eye protection not provided. Shut off flow of gas or liquid and keep cooling water streams on exposed tanks or containers. Use water spray carefully in vicinity of dusts so as not to create dust clouds (*NFPA 1978).

Unusual Fire and Explosion Hazards: Toxic vapors such as carbon dioxide and carbon monoxide are generated during combustion (*Environment Canada 1982). Explosion hazard: when aqueous formaldehyde solutions are heated above their flash points, a potential for explosion hazard exists. High formaldehyde concentration or methanol content lowers flash point. Reacts with nitrogen oxides at about 180; the reaction becomes explosive. Also reacts violently with perchloric acid-aniline, performic acid, nitromethane, magnesium carbonate, and hydrogen peroxide (Sax 1984, p. 1452).

NFPA Flammability Rating: 4 (gas); 2 (37% solution)

SECTION V -- REACTIVITY DATA

Stability: Unstable: Yes, aqueous solutions (*Lefaux 1968)
Stable: Yes, commercial formaldehyde-alcohol solutions (*Kirk-Othmer 1978); gas is stable in absence of water (*Health and Safety Executive Monograph 1981)

Conditions to Avoid: Oxidizing and alkaline materials (*NFPA 1978)

Incompatibility (Materials to Avoid): Reacts with peroxide, nitrogen oxide, and performic acid causing explosions (*Environment Canada 1982). Can react with hydrogen chloride or other inorganic chlorides to form bis-chloromethylether (BCME), a known carcinogen (*General Electric Co. 1981, MSDS 360). Very reactive, combines readily with many substances, 40% solution is powerful reducing agent (*Merck 1976). Incompatible with amines, azo compounds, dithiocarbamates, alkali and alkaline earth metals, nitrides, nitro compounds, unsaturated aliphatics and sulfides, organic peroxides, oxidizing agents, and reducing agents (*Environment Canada 1982).

Hazardous Decomposition or Byproducts: When heated, irritant formaldehyde gas evolved from solution (Sax 1984, p. 1452). The main products of

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SECTION V (continued)

decomposition are carbon monoxide and hydrogen. Metals such as platinum, copper, chromia, and alumina also catalyze the formation of methanol, methylformate, formic acid, carbon dioxide, and methane (*Kirk- Othmer 1978).

Hazardous Polymerization: May Occur: Yes (*Environment Canada 1982)
May Not Occur:

Conditions to Avoid: Compound will polymerize with active organic materials such as phenol (*General Electric Co. 1981, MSDS 360). Will polymerize violently in the presence of caustics and nitrides; (amines) exothermic reaction, (Azo compound) exothermic reaction giving off nitrogen gas, (caustics) heat generation and violent polymerization, (dithiocarbamates) formation of flammable gases and toxic fumes, formation of carbon disulfide may result, (alkali and alkaline earth metals) heat generation and formation of a flammable hydrogen gas (*Environment Canada 1982).

SECTION VI -- USE INFORMATION

Urea and melamine resins; polyacetal resins; phenolic resins; ethylene glycol; pentaerythritol; hexamethylenetetramine; fertilizer; dyes, medicine (disinfectant, germicide); embalming fluids; preservative; hardening agent; reducing agent, as in recovery of gold and silver; corrosion inhibitor in oil wells; durable-press treatment of textile fabrics; possible condensation to sugars and other carbohydrates for food use (experimental); industrial sterilant; treatment of grain smut (Hawley 1977, p. 395).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors; do not get water inside container. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 29). Use fluorocarbon water spray, Cellosize, and Hycar to diminish vapors. Use sodium carbonate, ammonium hydroxide or sodium sulfite to neutralize spill. Use universal gel, fly/ash, universal sorbent material, or cement powder to absorb the spill (*Environment Canada 1982).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FORMALDEHYDE

CAS Registry Number: 50-00-0

Synonyms: BFV; FA; Fannoform; Formaldehyde solution; Formaldehyde, as Formalin solution (DOT); Formaldehyde, gas; Formalin; Formalin 40; Formalith; Formic Aldehyde; Formol; Fyde; Hoch; Ivalon; Karsan; Lysoform; Methanal; Methyl Aldehyde; Methylene Glycol; Methylene Oxide; Morbicid; NCI-C02799; Oxomethane; Oxymethylene; Superlysoform

Chemical Formula: CH_2O

Molecular Weight: 30.03

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 500 (pounds)

RQ: 1,000 (pounds) (statutory); 100 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -3.1°F, -19.5°C at 760 mmHg (*Merck 1976); commercial aqueous formaldehyde boils at 205°F, 96°C (Merck 1983, p. 604)

Specific Gravity (H_2O=1): 1.067 (*Merck 1976); 0.815 at -20°C/4°C for anhydrous form (Merck 1983, p. 604)

Vapor Pressure (mmHg): 10 at -88°C (*Patty 1963), for anhydrous form

Melting Point: -134°F,-92°C (*Merck 1976), for anhydrous form

Vapor Density (AIR=1): 1.03 for aqueous solution; 1.075 for gas (*Environment Canada 1982), 1.067 for gas (Merck 1983, p. 604)

FORMALDEHYDE

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble in water, up to 55% (*Merck 1976)

Appearance and Odor: Gas or liquid, strong, pungent odor, clear, water-white (Sax 1984, p. 145).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 3 ppm; Ceiling Concentration 5 ppm; Peak Concentration 10 ppm/30 minutes/8 hours (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 1.5 mg/m^3 (1 ppm) (*ACGIH 1980); STEL 3 mg/m^3 (2 ppm) (ACGIH 1986-87, p.19)

IDLH: 100 ppm (NIOSH/OSHA 1978, p. 104)

Other Limits Recommended: Occupational exposure to formaldehyde recommended standard -- air ceiling concentration 1.2 mg/m^3/30 minutes (*NIOSH/RTECS 1985). Industrial substance suspect of carcinogenic potential for humans recommended standard 1 ppm (ACGIH 1984, p. 42)

Routes of Entry: **Inhalation:** Yes (Proctor and Hughes 1978, pp. 272-273)
Skin: Yes (Environment Canada 1982)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): The probable oral lethal dose for humans is 0.5-5 g/kg, or between 1 ounce and 1 pint for a 150 pound person (*Gosselin 1976). Acute -- below 1 ppm, odor perceptible to most. 2-3 ppm, mild tingling of eyes. 4-5 ppm, increased discomfort, mild lacrimation. 10 ppm, profuse lacrimation; can be withstood only for few minutes. 10-20 ppm, breathing difficult, cough, severe burning of nose and throat. 50-100 ppm, acute irritation of respiratory tract, very serious injury likely. Skin -- primary irritation from strong solutions, gas. Delayed -- sensitization dermatitis (Proctor and Hughes 1978, pp. 272-273). Suspected carcinogen (*Kirk-Othmer 1978). Effects in women include menstrual disorders and secondary sterility (*IARC 1972-1985). Solutions splashed in eyes have caused injuries ranging from severe, permanent corneal opacification and loss of vision to minor discomfort (*Grant 1974).

Medical Conditions Generally Aggravated by Exposure: In people sensitized to formaldehyde, late asthmatic reactions may be provoked by brief exposures at approximately 3 ppm (*Hendrick 1982).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 60°C/40% solution (*Merck 1976)
Flammable Limits:
LEL: 7% (*Sax 1975)

ORGANORHODIUM COMPLEX

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Catalyst (PMN-82-147).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do it without risk. Small spills: take up with sand or other non-combustible 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- GENERIC NAME: ORGANORHODIUM COMPLEX

(This chemical was identified from a Premanufacture Review Notice (PMN) submitted to EPA. The submitter has claimed certain information on the submission to be confidential, including specific chemical identity, chemical formula, and molecular weight.)

CAS Registry Number: Not Found

Synonyms: Not Found

Chemical Formula: Not Found

Molecular Weight: Not Found

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.08 mg/liter (submitter's estimate) (PMN-82-147)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (PMN-82-147)

ORGANORHODIUM COMPLEX

SECTION II (continued)

Appearance and Odor: Green crystals (PMN-82-147)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Rhodium metal fume dust) 0.1 mg/m^3, as rhodium (NIOSH 1987, p. 204)

ACGIH TLV: (Insoluble Rhodium Compounds) TWA 1 mg/m^3, as rhodium (AC 1984, p. 29)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Organometals) Organometals may be highly toxic orally. They are irritating to skin, eyes, and mucous membranes. They can damage lung tissue and the liver (Sax 1984, p. 2095).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do it without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: (Non-Specific -- Poisonous Solid, n.o.s.) Fire may produce irritating or poisonous gases (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FLUOROURACIL

CAS Registry Number: 51-21-8

Synonyms: Uracil, 5-Fluoro-; 5-Fluorouracil; Efudex; Fluoroplex; 2,4-Dioxo-5-Fluoropyrimidine; 5-Fluoro-2,4(1H,3H)-Pyrimidinedione; 5-Fluoro-2,4-Pyrimidinedione; 5-Fluoropyrimidine-2,4-Dione; 5-Fluoropyrimidine-2,4-Dione; Fluoro Uracil; Fluracil; Fluril; FU; 5-FU; NSC 19893; RO 2-9757; U-8953; 2,4(1H,3H)-Pyrimidinedione, 5-Fluoro-

Chemical Formula: $C_4H_3FN_2O_2$

Molecular Weight: 130.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rabbit) 18.9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Decomposes at 540-541°F, 282-283°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g in 80 mL of water (*Osol 1975)

FLUOROURACIL

SECTION II (continued)

Appearance and Odor: White to practically white crystalline powder; practically odorless (*Osol 1975)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Physicians' Desk Reference 1980, p. 1452)
Ingestion: Yes (*Goodman 1975)

Health Hazards (Acute, Delayed, and Chronic): Minimum toxic dose in humans is approximately 450 mg/kg (total dose) over 30 days for the ingested drug. Intravenous minimum toxic dose in humans is a total dose of 6 mg/kg over three days. Depression of white blood cells occurred after intravenous administrative of a total dose of 480 mg/kg over 32 days (*NIOSH/RTECS 1978).

Medical Conditions Generally Aggravated by Exposure: Occasional neuropathy and cardiac toxicity have been reported (Gilman 1985, pp. 1270-1271). Do not use during pregnancy (Physicians' Desk Reference 1980, p. 1455). Patients with impaired hepatic or renal function, with a history of high-dose pelvic irradiation or previous use of alkylating agents should be treated with extreme caution (Physicians' Desk Reference 1980, p. 1455). Patients with nutritional deficiencies and protein depletion have a reduced tolerance to fluorouracil (Gilman 1985, p. 1270).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Drugs or Medicines, n.o.s. (Solid) Poison B) Extinguish fire using agent suitable for type of surrounding fire (material itself burns with difficulty). Use water in flooding quantities as fog. Use "alcohol" foam, carbon dioxide or dry chemical (Student 1981, p. 215).

Special Fire Fighting Procedures: (Non-Specific -- Drugs or Medicines, n.o.s. (Solid) Poison B) Avoid breathing dusts, and fumes from burning material. Keep upwind. Avoid bodily contact with the material. Wear

FLUOROURACIL

SECTION IV (continued)

boots, protective gloves, and goggles. Wear self-contained breathing apparatus (Student 1981, p. 215).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Osol 1975)

Conditions to Avoid: Decomposing heat (*Merck 1976)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits very toxic fumes of flourides and nitrogen oxides when heated to decomposition (Sax 1984, p. 1450).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Antineoplastic drug (*Merck 1976); chemosterilant for insects (*White-Stevens 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Drugs) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. If water pollution occurs, notify appropriate authorities. Spill or leak: shut off ignition sources; no flares, smoking or flames in hazard area. Keep combustibles (wood, paper, oil etc.) away from spilled material. Do not touch spilled material. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 11).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

FLUOROURACIL

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Loss of appetite and nausea are earliest symptoms, with other symptoms of diarrhea, inflammation or sores in the mouth, gastric burning, and intestinal discomfort. More serious symptoms are due to the suppression of bone marrow, with decrease of white cell count and blood platelets, and anemia. Hair loss, nail changes, dermatitis, and pigmentation and atrophy of skin also occur (*Goodman 1975).

Emergency and First Aid Procedures: (Non-Specific -- Drugs) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 11).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MECHLORETHAMINE

CAS Registry Number: 51-75-2

Synonyms: 2,2'-Dichloro-N-Methyldiethylamine; 2-Chloro-N-(2-Chloroethyl)-N-Methylethanamine; Beta,Beta'-Dichlorodiethyl-N-Methylamine; Bis(2-Chloroethyl)Methylamine; Bis(Beta-Chloroethyl)Methylamine; Caryolysin; Chloramine (the nitrogen mustard); Chlorethazine; Chlormethine; Di(2-Chloroethyl) Methylamine; Dichlor Amine; Diethylamine, 2,2'-Dichloro-N-Methyl-; Embichin; ENT-25294; Ethanamine, 2-Chloro-N-(2-Chloroethyl)-N-Methyl-; HN2; MBA; Methylbis(2-Chloroethyl)Amine; Methylbis(Beta-Chloroethyl)Amine; Methylbis (Chloroethylamine); Methyldi(2-Chloroethyl)Amine; Mustargen; Mustine; N,N-Bis(2-Chloroethyl)methylamine; N,N-Di(Chloroethyl)Methylamine; N-Methyl-2,2'-Dichlorodiethylamine; N-Methyl-bis(2-Chloroethyl)Amine; N-Methyl-Bis(Beta-Chloroethyl)Amine; N-Methylbis(2-Chloroethyl)Amine; N-Methylbis(Beta-Chloroethyl)Amine; Nitrogen Mustard; NSC 762; TL 146

Chemical Formula: $C_5H_{11}Cl_2N$

Molecular Weight: 156.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (rat) 14 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 189°F, 87°C at 18 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.118 at 25°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: -76°F, -60°C (*Merck 1976)

MECHLORETHAMINE

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very slightly soluble (*Merck 1976)

Appearance and Odor: Mobile liquid; faint odor of herring (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Gilman 1980)
Skin: Yes (*Gilman 1980)
Ingestion: Yes (*Gilman 1980)

Health Hazards (Acute, Delayed, and Chronic): Toxic doses as low as 400 mg/kg have been reported in humans (*NIOSH/RTECS 1985). Blood clots may occur at site of intravenous injection and tissue damage if outside vein. Powerful vesicant (causes blisters) when it contacts skin, mucous membranes, or eyes. Delayed toxicity -- missed menstrual periods, alopecia (hair loss), hearing loss, tinnitus (ringing in ears), jaundice, impaired spermatogenesis and germinal aplasia, swelling, and hypersensitivity (*Gilman 1980).

Medical Conditions Generally Aggravated by Exposure: May damage fetus in pregnant women (*Gilman 1980).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

MECHLORETHAMINE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Merck 1976)
Stable:

Conditions to Avoid: Undiluted liquid decomposes on standing (*Merck 1976)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Drug used in treatment of cancer (*Gilman 1980). Formerly used as a gas warfare agent (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

MECHLORETHAMINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
Chemical Resistance/Amount of Data)

Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Nausea and vomiting; bleeding; skin lesions; menstrual irregularities (*Gilman 1980).

Emergency and First Aid Procedures: Treat symptoms using procedures for general poison (*Rumack 1975 to Present). (Non-Specific -- Poisonous Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CARBACHOL CHLORIDE

CAS Registry Number: 51-83-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 917) Choline, Chloride, Carbamate; Carbachol; Carbacholin; Carbacholine; Carbacholine Chloride; Carbacolina; Carbamic Acid, Ester with Choline Chloride; Carbaminocholine Chloride; Carbaminoylcholine Chloride; Carbamiotin; Carbamoylcholine Chloride; gamma-Carbamoyl Choline Chloride; Carbamoylcholine-Hydrochloride; Carbamylcholine Chloride; Carbochol; Carbocholin; Carbocholine; Carbyl; Carcholin; Choline Carbamate Chloride; Choline, Chloride Carbamate(Ester); Choline Chloride, Carbamoyl-; Choline Chlorine Carbamate; Coletyl; Doryl; Doryl (Pharmaceutical); Ethanaminium, 2-((Aminocarbonyl)oxy)-N,N,N-Trimethyl-, Chloride; (2-Hydroxyethyl)Trimethyl Ammonium Chloride Carbamate; Isopto Carbachol; Jestryl; Lentin; Miostat; Mistura C; Moryl; P.V. Carbachol; TL 457; Vasoperif

Chemical Formula: $C_6H_{15}N_2O_2Cl$

Molecular Weight: 182.68

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 15 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 392-401°F, 200-205°C (Merck 1983, p. 245)

CARBACHOL CHLORIDE

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g/mL (Merck 1983, p. 245)

Appearance and Odor: Crystalline, odorless, but on standing in an open container, develops a faint odor resembling that of an aliphatic amine (Merck 1983, p. 245); hygroscopic prisms or powder (Weast 1979, p. C-246)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 631)
Ingestion: Yes (Sax 1984, p. 631)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic by mouth (Sax 1984, p. 631).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: The aqueous solution is stable even when heated (Merck 1983, p. 245).

CARBACHOL CHLORIDE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of chloride and nitrogen oxides (Sax 1984, p. 631).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Cholinergic; parasympathomimetic, used chiefly in large animals, especially for colic in the horse (Merck 1983, p. 245)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid skin contact (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

DOT 1984
Farm Chemicals Handbook 1984
Gilman 1985
Hayes 1982
Gosselin 1984
Buchel 1983
Clayton and Clayton 1981-82
Hawley 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NICOTINE

CAS Registry Number: 54-11-5

Synonyms: (-)-3-(1-Methyl-2-Pyrrolidyl)Pyridine; 1-Methyl-2-(3-Pyridyl) Pyrrolidine; beta-Pyridyl-alpha-N-Methylpyrrolidine; Destruxol Orchid Spray; EMO-NIK; ENT 3,424; Flux Maag; Fumetobac; L-3-(1-Methyl-2-Pyrrolidyl)Pyridine; L-Nicotine; Mach-Nic; Niagara PA Dust; Nic-Sal; Nico-Dust; Nico-Fume; Nicocide; Nicotin; Nicotine Alkaloid; Ortho N-4 Dust; Ortho N-5 Dust; Pyridine, 3-(1-Methyl-2-Pyrrolidinyl)-, (S)-; Pyridine, 3-(Tetrahydro-1-Methylpyrrol-2-yl); Pyrrolidine, 1-Methyl-2-(3-Pyridyl)-; Tendust; Tetrahydronicotyrine, DL-

Chemical Formula: $C_{10}H_{14}N_2$

Molecular Weight: 162.23

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: Not Found

TPQ: 100 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 476.1°F, 246.7°C at 745 mmHg (*Weast 1979)

Specific Gravity (H_2O=1): 1.0097 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 1 at 61.8°C (Sax 1984, p. 1997)

Melting Point: -110°F, -79°C (*Weast 1979)

Vapor Density (AIR=1): 5.61 (Sax 1984, p. 1997)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible below 60°C (*Merck 1983)

NICOTINE

SECTION II (continued)

Appearance and Odor: Colorless to pale yellow, oily liquid (*Merck 1983). Slight, fishy odor when warm (NIOSH/OSHA 1978, pp. 138-139).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.5 mg/m^3 (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.5 mg/m^3 (skin) (*ACGIH 1983)

IDLH: 35 mg/m^3 (NIOSH/OSHA 1978, p. 138-139)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1997)
Skin: Yes (Merck 1983, p. 935)
Ingestion: Yes (Sax 1984, p. 1997)

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. Probable oral lethal dose in humans is less than 5 mg/kg or a taste (less than 7 drops) for a 70 kg (150 lbs.) person (*Gosselin 1976). It may be assumed that ingestion of 40-60 mg of nicotine is lethal to humans. There is fundamental difference between acute toxicity from use of nicotine as insecticide or from ingestion, and chronic toxicity that may be caused by prolonged exposure to small doses as occurs in smoking (*Encyc Occupat Health and Safety 1983). Maternal smoking during pregnancy is associated with increased risk of spontaneous abortion, low birth weight and still-birth (*The Chemical Society 1975). Nicotine was found as a co-carcinogen in animals (*NRC 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Low fire hazard when exposed to heat or flame (Sax 1984, p. 1997)
LEL: 0.75% (Sax 1984, p. 1997)
UEL: 4.0% (Sax 1984, p. 1997)

Extinguishing Methods: Extinguish with alcohol foam, dry chemical, or carbon dioxide (Sax 1984, p. 1997). Water may cause frothing if it gets below surface of liquid and turns to steam. However, water fog gently applied to surface will cause frothing which will extinguish the fire (*NFPA 1978).

Special Fire Fighting Procedures: Material too dangerous to health to expose firefighters. A few whiffs of the vapor could cause death; vapor or liquid could be fatal on penetrating firefighter's normal full protective clothing. Normal full protective clothing and breathing apparatus available to the average fire department will not provide adequate protection against inhalation or skin contact (*NFPA 1978).

NICOTINE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: There is a moderate explosion hazard when exposed to heat or flame (Sax 1984, p. 1997).

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (normal conditions) (*NFPA 1978)

Conditions to Avoid: Heat or flames (*Sax 1975)

Incompatibility (Materials to Avoid): Avoid oxidizing materials (Sax 1984, p. 1997).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits nitrogen oxides, carbon monoxide and other highly toxic fumes (Sax 1984, p. 1997).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an insecticide, fumigant and in veterinary matters as an ectoparasiticide and anthelmintic (*Merck 1983). Also, used in tanning (*NRC 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

The normal full protective clothing and breathing apparatus available to the average fire department will not provide adequate protection against inhalation or skin contact with this material (*NFPA 1978). Do not touch spilled material; stop leak; reduce vapors with water spray. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

NICOTINE

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide
for
NICOTINE

(54-11-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to pale yellow oily liquid; brown on exposure to air.

Odor - Slightly fishy odor when warm.

Commercial Forms - 93 to 98% pure liquid; 3 to 5% dust.

Uses - Insecticide, fumigant, veterinary medicine, tanning.

Other Names - Black Leaf 40, Destruxol Orchid Spray; Futemobac; Nico-dust; Nico-Fume; Ortho N-4 Dust; Ortho N-5 Dust; (S)-3-(1-methyl-2-pyrrolidinyl) pyridine; Tendust.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, atropine.

Signs and Symptoms of Acute Nicotine Exposure:

Warning: *Seizures may be rapid in onset. Caution is advised.*

Acute exposure to nicotine may result in headache, dizziness, confusion, agitation, restlessness, lethargy, seizures, and coma. Victims may experience hypertension (high blood pressure), tachycardia (rapid heart rate), and tachypnea (rapid respirations), followed by hypotension (low blood pressure), bradycardia (slow heart rate), and respiratory depression. Cardiac arrhythmias may also occur.

NICOTINE

Gastrointestinal effects include nausea, vomiting, abdominal pain or burning sensation, and diarrhea. Increased salivation, lacrimation (tearing), and sweating may be noted.

Emergency Life-Support Procedures:

Acute exposure to nicotine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to nicotine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to nicotine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. THOROUGHLY wash exposed skin areas with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

NICOTINE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- AMINOPTERIN

CAS Registry Number: 54-62-6

Synonyms: (NIOSH/RTECS 1983, Synonyms, Volume 2, p. 375) Glutamic Acid, N-(p-(((2,4-Diamino-6-Pteridinyl)Methyl)Amino)Benzoyl)-, L-; 4-Amino-4-Deoxypteroylglutamate; 4-Amino-PGA; Aminopteridine; 4-Aminopteroylglutamic Acid; A-Ninopterin; APGA; N-(4-((2,4-Diamino-6-Pteridinyl)Methyl)Amino)Benzoyl)-L-Glutamic Acid; ENT-26079; Folic Acid, 4-Amino-; NSC 739; L-Glutamic Acid, N-[4-[(Diamino-6-Pteridinyl)Methyl] Amino]Benzoyl]-

Chemical Formula: $C_{19}H_{20}N_8O_5$

Molecular Weight: 440.47

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{lo} oral (rat) 2.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

AMINOPTERIN

SECTION II (continued)

Appearance and Odor: Clusters of yellow needles (Hawley 1981, p. 55)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Hawley 1981, p. 55)

Health Hazards (Acute, Delayed, and Chronic): An antimetabolite; antagonizes the utilization of folic acid by the body. Highly toxic by ingestion (Hawley 1981, p. 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

AMINOPTERIN

SECTION V (continued)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Rodenticide (Merck 1983, pp. 70-71); medicine and rodenticide (Hawley 1981, p. 55). Not registered as a rodenticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOFLUORPHATE

CAS Registry Number: 55-91-4

Synonyms: Diisopropyl Fluorophosphate; DFP; Diflupyl; Diflurphate; Diisopropoxyphosphoryl Fluoride; Diisopropyl Fluorophosphonate; Diisopropyl Phosphofluoridate; Diisopropyl Phosphorofluoridate; Diisopropylfluoro-phosphate; Diisopropylfluorophosphoric Acid Ester; Diisopropylphosphoro-fluoridate; Dyflos; Dyphlos; Floropryl; Fluophosphoric Acid, Diisopropyl Ester; Fluorodiisopropyl Phosphate; Fluostigmine; Fluropryl; Isofluro- phosphate; Isopropyl Fluophosphate; Isopropyl Phosphorofluoridate; Neoglaucit; O,O'-Diisopropyl Phosphoryl Fluoride; O,O,-Diisopropyl Fluorophosphate; PF-3; Phosphorofluoridic Acid, Bis(1-Methylethyl) Ester; Phosphorofluoridic Acid, Diisopropyl Ester; T-1703; TL 466; Fluorophosphoric Acid, Diisopropyl Ester; Fluoropryl; Isofluorophate; Isoflurophate

Chemical Formula: $C_6H_{14}FO_3P$

Molecular Weight: 184.15

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.36 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 144°F, 62°C at 9 mmHg (*Merck 1983)

Specific Gravity (H_2O=1): 1.055 (*Merck 1983)

Vapor Pressure (mmHg): 0.579 at 20°C (*Merck 1983)

Melting Point: -116°F, -82°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

ISOFLUORPHATE

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1.54% by weight at 25°C (*Merck 1983)

Appearance and Odor: Oily liquid (*Hawley 1981). Clear, colorless or faintly yellow liquid (*Osol 1980).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Merck 1983)
Skin: Yes (Sax 1984, p. 1667)
Ingestion: Yes (*Gosselin 1984)

Health Hazards (Acute, Delayed, and Chronic): This is an organophosphate pesticide (*Morgan 1982). Extremely toxic: probable oral lethal dose in humans is 5-50 mg/kg, between 7 drops and 1 teaspoonful for 70 kg person (150 lb.) (*Gosselin 1984). The material is a cholinesterase inactivator. Even traces of the vapor cause pinpoint pupils (*Merck 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorous Pesticide, n.o.s.) Dry chemical, carbon dioxide, water spray, or foam. For large fires, water spray, fog, or foam. Fight fire from maximum distance. Dike fire control water for later disposal (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: May burn but will not ignite readily. Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

ISOFLUORPHATE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Merck 1983)

Conditions to Avoid: Forms hydrofluoric acid in presence of moisture (*Merck 1983). Keep away from sources of heat (*Farm Chemicals Handbook 1984). Anhydrous compounds or oil solutions are stable in glass containers at room temperature (*Merck 1983).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Forms hydrogen fluoride in presence of moisture; decomposes in water at pH about 2.5 (*Merck 1983).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Research tool in neuroscience for its ability to inhibit cholinesterase (by phosphorylation) on an acute/sub-acute basis and to produce a delayed neuropathy (*Peer Review Committee). An insecticide. Used in Germany as a basis for "nerve gases" (Sax 1984, p. 1667).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

When handling in open containers, protect the eyes, nose, and mouth with a suitable mask, and avoid contact with skin (*Osol 1980).

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. Dike far ahead of large spills for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

ISOFLUORPHATE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Respiration depression, muscle weakness, twitching, and convulsions. Sweating, visual disturbances, vomiting, diarrhea, chest and abdominal distress, and sometimes pulmonary edema (*Morgan 1982).

Emergency and First Aid Procedures: Do not inhale vapors; avoid contact with skin (*Merck 1983). (Non-Specific -- Organophosphorous Pesticide, n.o.s.) Move victim to fresh air; 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 boc temperature. Effects may be delayed; keep victim under observation (DO 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CANTHARIDIN

CAS Registry Number: 56-25-7

Synonyms: 7-Oxabicyclo[2.2.1]Heptane-2,3-Dicarboxylic Anhydride, 2,3-Dimethyl-; 1,2-Dimethyl-3,6-Epoxyperhydrophthalic Anhydride; 4,7-Epoxyisobenzofuran-1,3-Dione, Hexahydro-3a,7a-Dimethyl-, (3a alpha, 4 beta, 7 beta, 7a alpha)-; 2,3-Dimethyl-7-Oxabicyclo[2.2.1]Heptane-2,3- Dicarboxylic Anhydride; CAN; Cantharides Camphor; Cantharidine; Cantharone; Exo-1,2-cis-Dimethyl-3,6-Epoxyhexahydrophthalic Anhydride; Hexahydro-3a alpha, 7a alpha-Dimethyl-4 beta, 7 beta-Epoxyisobenzofuran-1,3-dione; Kantaridin

Chemical Formula: $C_{10}H_{12}O_4$

Molecular Weight: 196.21

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{lo} oral (human) 0.428 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Sublimes at 230°F, 110°C (Merck 1983, p. 242)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 424°F, 218°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble in cold water (*Merck 1976); somewhat

CANTHARIDIN

SECTION II (continued)

soluble in hot water (*Merck 1976).

Appearance and Odor: Brown to black powder (Sax 1984, p. 627); orthorhombic plates, scales (Merck 1983, p. 242).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1979)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Arena 1979)

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. Probable oral lethal dose in humans is less than 5 mg/kg or a taste of less than 7 drops for a 70 kg (150 lb.) person (*Gosselin 1976). It is very toxic by absorption through skin (*Merck 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

CANTHARIDIN

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits acrid smoke and irritating fumes (*Sax 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Formerly used as a counter-irritant and vesicant (*IARC 1972-1985). Also used for the removal of benign epithelial growth, e.g., warts (*Gilman 1980). Used as an experimental antitumor agent. Active ingredient in spanish fly, a reputed aphrodisiac (*Peer Review Committee).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms from ingestion include vomiting, abdominal pain, shock, bloody diarrhea, pain in throat and stomach, swelling and blistering of tongue, difficulty swallowing, salivation, slow and painful urination, and thirst. There may be delirium, fainting, and tetanic convulsions (*Goodman 1975, *Rumack 1975 to Present, *Arena 1979, *Gosselin 1976). Eye contact results in irritation with much swelling of the lids (*Grant 1974). Initial tissue reaction upon contact with the skin is swelling followed by blister formation within 24 hours (*Doull 1980).

Emergency and First Aid Procedures: For ingestion, induce vomiting with syrup of ipecac. For skin contact thoroughly wash contaminated area with soap and water. Eyes should be irrigated with plain tap water (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PARATHION

CAS Registry Number: 56-38-2

Synonyms: Phosphorothioic Acid, O,O-Diethyl O-(p-Nitrophenyl) Ester (Liquid Mixture); Parathion liquid; Alkron; Alleron; American Cyanamid 3422; Aphamite; Bayer E-605; Bladan; Diethyl 4-Nitrophenyl Phosphorothionate; Diethyl p-Nitrophenyl Thionophosphate; Diethyl Parathion; Diethyl-p-Nitrophenyl Monothiophosphate; DNTP; E 605; ENT 15,108; Ethyl Parathion; Etilon; Folidol; Fosferno; Fostox; Genithion; NA 2783 (DOT); NCI-C00226; Niran; Nitrostigmine; O,O-Diethyl O-(p-Nitrophenyl) Phosphorothioate; O,O-Diethyl O-(p-nitrophenyl) Thionophosphate; O,O-Diethyl O-4-Nitrophenyl Thiophosphate; O,O-Diethyl O-p-Nitrophenyl Phosphorothioate; Oleoparathion; Panthion; Paraflow; Paramar; Paraphos; Parawet; Phenphos; Phoskil; Phosphenol; Phosphorothioic Acid O,O-Diethyl O-(4-Nitrophenyl) Ester; Rhodiatox; SNP; Stathion; Sulphos; Thiophos; Vapophos

Chemical Formula: $C_{10}H_{14}NO_5PS$

Molecular Weight: 291.27

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.084 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 707°F, 375°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.26 (*Merck 1983)

Vapor Pressure (mmHg): 0.0000378 at 20°C (*Worthing 1979)

Melting Point: 43°F, 6°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

PARATHION

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble; 12.4 mg/liter at 20°C (*Bowman 1979)

Appearance and Odor: Pale yellow liquid; technical grade is brown and has a garlic-like odor (*Worthing 1979).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 mg/m^3 (NIOSH 1978, p. 148)

ACGIH TLV: TWA 0.1 mg/m^3 (skin) (ACGIH 1986-87, p.26)

IDLH: 20 mg/m^3 (*Encyc of Occupat Health and Safety 1983)

Other Limits Recommended: NIOSH: 0.05 mg/m^3, 10 hour TWA (NIOSH 1987, p. 184)

Routes of Entry: **Inhalation:** Yes (*Gosselin 1976)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150-lb. person. As little as 1 drop can endanger life if splashed in the eye. Toxicity is highest by inhalation (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: People at special risk are those with a history of glaucoma, cardiovascular disease, hepatic disease, renal disease, or central nervous system abnormalities (*Encyc Occupat Health and Safety 1983).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 248-320°F, 120-160°C (Method not given) (*Clayton and Clayton 1981-82)
Flammable Limits: Not highly flammable (*Encyc Occupat Health and Safety 1971)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use water spray, dry chemical, foam, or carbon dioxide (*NFPA 1978).

Special Fire Fighting Procedures: Use water spray to keep fire-exposed

PARATHION

SECTION IV (continued)

containers cool. If a leak or spill has not ignited, use water spray to disperse vapors and to provide protection for firefighters. Water spray may be used to flush spills away from exposures. Fight advanced or massive fires from a safe distance or from a protected location. Special protective clothing should be worn; normal protective clothing may be penetrated (*NFPA 1978).

Unusual Fire and Explosion Hazards: When heated to decomposition, it can emit toxic fumes of oxides of nitrogen, phosphorus, and sulfur. High pressure hoses may scatter material from broken containers (*NFPA 1978). Containers may explode when heated (*CHRIS 1978).

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, in distilled water and in acid solution (*Hawley 1981)

Conditions to Avoid: Store below 25-30°C (*Farm Chemicals Handbook 1983). It slowly decomposes in air and hydrolyzes in the presence of alkaline material (*Hawley 1981). Containers may explode when heated (*CHRIS 1978).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, the material can emit toxic fumes of oxides of nitrogen, phosphorus, and sulfur (*NFPA 1978).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide (*SRI) and is used almost exclusively in agriculture (Hayes 1982, p. 379).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

In case of leaks or spills, special protective clothing should be worn. Use water spray to disperse vapors and flush spills away (*NFPA 1978). Ventilate area of spill or leak. Spills may be absorbed in vermiculite, dry sand, earth, or a similar material (*NIOSH/OSHA 1981).

PARATHION

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PARATHION

(56-38-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Pale yellow or brown liquid.

Odor - Garliclike (commercial form).

Commercial Form - Deep brown liquid in tins and steel drums.

Use - Pesticide.

Materials to Avoid - Alkali, strong oxidizers.

Other Names - Alkron; Alleron; DNTP; ethyl parathion; Etilon; Folidol; Fosferno; Fostex; Genithion; Niran; Nitrostigmine; Oleoparathion; Paraflow; Paramar; Paraphos; Parawet; Phoskil; Phosphenol; phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl) ester; Rhodiatox; Stathion; Thiophos; Vapophos.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Parathion Exposure:

Caution: *Parathion is a cholinestorase inhibitor. It has been reported that as little as one drop of parathion can endanger life if splashed in the eye. Toxicity is highest by inhalation.*

Acute exposure to parathion may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

PARATHION

The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

Emergency Life-Support Procedures:

Acute exposure to parathion may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to parathion.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to parathion.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

PARATHION

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of parathion is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of parathion may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- COUMAPHOS

CAS Registry Number: 56-72-4

Synonyms: 3-Chloro-4-Methyl-7-Coumarinyl Diethyl Phosphorothioate; 3-Chloro-4-Methyl-7-Hydroxycoumarin Diethyl Thiophosphoric Acid Ester; 3-Chloro-4-Methylumbelliferone O-Ester with O,O-Diethyl Phosphorothioate; 3-Chloro-7-Hydroxy-4-Methyl-Coumarin O,O-Diethyl Phosphorothioate; 3-Chloro-7-Hydroxy-4-Methyl-Coumarin O-Ester with O,O-Diethyl Phosphorothioate; Agridip; Asunthol; Asuntol; Azunthol; Bay 21/199; Bayer 21/199; Baymix; Baymix 50; Co-Ral; Coumafos; Coumarin, 3-Chloro-7-Hydroxy-4-Methyl-, O-Ester with O,O-Diethyl Phosphorothioate; Diethyl 3-Chloro-4-Methylumbelliferyl Thionophosphate; Diethyl Thiophosphoric Acid Ester of 3-Chloro-4-Methyl-7-Hydroxycoumarin; Diolice; ENT 17,957; Meldane, Meldone, Muscatox, NCI-C08662; O,O-Diethyl 3-Chloro-4-Methyl-7-Umbelliferone Thiophosphate; O,O-Diethyl O-(3-Chloro-4-Methyl-2-Oxo-2H-Benzopyran-7-yl) Phosphorothioate; O,O-Diethyl O-(3-Chloro-4-Methyl-7-Coumarinyl) Phosphorothioate; O,O-Diethyl O-(3-Chloro-4-Methylcoumarinyl-7) Thiophosphate; O,O-Diethyl O-(3-Chloro-4-Methylumbelliferone) Thiophosphate; O,O-Diethyl O-(3-Chloro-4-Methylumbelliferyl) Phosphorothioate; O-3-Chloro-4-Methyl-7-Coumarinyl O,O-Diethyl Phosphorothioate; Phosphorothioic Acid, O,O-Diethyl Ester, O-Ester with 3-Chloro-7-Hydroxy-4-Methylcoumarin; Phosphorothioic Acid, O-(3-Chloro-4-Methyl-2-Oxo-2H-1-Benzopyran-7-yl) O,O-Diethyl Ester; Resistox; Resitox; Suntol; Umbethion

Chemical Formula: $C_{14}H_{16}ClO_5PS$

Molecular Weight: 362.78

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.303 mg/liter (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

COUMAPHOS

SECTION II (continued)

Specific Gravity (H_2O=1): 1.31 at 25°C (*Spencer 1973)

Vapor Pressure (mmHg): 0.0000001 at 20°C (*Spencer 1973)

Melting Point: 196°F; 91°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Merck 1983)

Appearance and Odor: Slightly brownish crystals (*Merck 1983). Slight odor of sulfur compound (*CHRIS 1978)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Very toxic, probable oral lethal dose is 50-500 mg/kg, or between 1 teaspoonful and 1 oz. for a 70 kg (150 lb.) person (*Gosselin 1976). May be fatal if inhaled, swallowed, or absorbed through skin. Contact may cause burns to skin and eyes (*DOT 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material may burn but does not ignite easily (*DOT 1984). Extinguish with water, foam, carbon dioxide, or dry chemicals (*CHRIS 1978)

Special Fire Fighting Procedures: Use organic vapor respirator, rubber gloves, and goggles (*CHRIS 1978). Dike fire control water for disposal later (*DOT 1984).

COUMAPHOS

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Toxic and irritating oxides of sulfur and phosphorus may form in fire (*CHRIS 1978).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Stable in water (*Merck 1983)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Incompatible with piperonyl butoxide (*Farm Chemicals Handbook 1983)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of sulfur oxides, phosphorus oxides, and chlorides (Sax 1984, p. 726)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

For control of a wide variety of livestock insects including cattle grubs, lice, scabies, flies, and ticks; the common ectoparasites of sheep, goats, horse, swine, and poultry as well as for screwworms in all these animals (Farm Chemicals Handbook 1983, p. C61).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

COUMAPHOS

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for COUMAPHOS

(56-72-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White crystals.

Odor - Slightly sulfurous.

Commercial Forms - 1 and 5% pure dusts, 3% pure spray foam, 5 to 50% pure slightly brownish crystals, 25% pure wettable powder.

Use - Veterinary insecticide.

Other Names - Agridip; Asuntol; 3-chloro-4-methyl-7-coumarinyl diethyl phosphorothioate; Co-Ral; Coumafos; Meldane; Muscatox; Negasunt; Resistox; Suntol; Umbethion.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Coumaphos Exposure:

Note: Coumaphos is a cholinesterase inhibitor.

Acute exposure to coumaphos may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) and chest pain may be noted. Hypertension (high blood pressure) is not uncommon. Respiratory effects include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

COUMAPHOS

Emergency Life-Support Procedures:

Acute exposure to coumaphos may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to coumaphos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to coumaphos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

COUMAPHOS

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of coumaphos is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of coumaphos may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETHYLHYDRAZINE

CAS Registry Number: 57-14-7

Synonyms: As-Dimethylhydrazine; Asym Dimethylhydrazine; Asymmetric Dimethylhydrazine; Dimazin; Dimazine; 1,1-Dimethylhydrazine; Dimethylhydrazine Unsymmetrical; DMH; Hydrazine, 1,1-Dimethyl; N,N-Dimethylhydrazine; U-Dimethylhydrazine; UDMH; Uns-Dimethylhydrazine; Unsym-Dimethylhydrazine; Unsymmetrical-Dimethylhydrazine

Chemical Formula: $C_2H_8N_2$

Molecular Weight: 60.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mus) 0.422 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 147°F, 63.9°C at 760 mmHg (*Merck 1983)

Specific Gravity (H_2O=1): 0.7914 at 22°C/4°C (*IARC 1972-1985)

Vapor Pressure (mmHg): 157 mmHg at 25°C (Sax, 1986, p.65)

Melting Point: -72°F, -58°C (*Merck 1983)

Vapor Density (AIR=1): 1.94 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble (*Encyc Occupat Health and Safety 1983)

Appearance and Odor: Clear, colorless liquid with characteristic ammonia-like fish odor (*IARC 1972-1985).

DIMETHYLHYDRAZINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 mg/m^3, (0.5 ppm) (NIOSH 1987, p.108)

ACGIH TLV: TWA 1 mg/m^3, (0.5 ppm) (skin) (ACGIH 1986-87, p.17)

IDLH: 50 ppm (NIOSH/OSHA 1978, p. 88)

Other Limits Recommended: NIOSH: 0.15 mg/m^3, 120 minute ceiling (NIOSH 1987, p.108). Industrial substance suspect of carcinogenic potential for humans (ACGIH 1983, p. 43). SPEGL 0.24 ppm (60 minutes) (NRC 1985b, pp. 37-48).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): This compound exhibits high acute toxicity as a result of exposure by all routes. Death or permanent injury may result after very short exposure to small quantities (*Sax 1975). Chronic exposure may cause pneumonia, liver damage, and kidney damage (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 5°F, -15°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 2% (*Sax 1979)
UEL: 95% (*Sax 1979)

Extinguishing Methods: Use dry chemical, carbon dioxide, water spray, or foam for small fires (*DOT 1984). In large fires water fog, carbon dioxide, and bicarbonate agents may allow flashback and explosive re-ignition (*CHRIS 1978).

Special Fire Fighting Procedures: Move containers from fire area if it can be done without risk. Dike fire control water for later disposal, do not scatter the material. Cool containers that are exposed to flames with water until well after fire is out, wear positive pressure breathing apparatus and special protective clothing. Isolate for one-half mile in all directions if tank car or truck is involved in fire (*DOT 1984).

Unusual Fire and Explosion Hazards: Vapor may explode if ignited in an enclosed area (*CHRIS 1978). Vapors may travel to a source of ignition and flashback. Runoff to sewer may create fire or explosion hazard (*DOT 1984).

NFPA Flammability Rating: 3

DIMETHYLHYDRAZINE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (NFPA 1984, p. 325M-43)

Conditions to Avoid: Dangerous when exposed to heat, flame, or oxidizers (*Sax 1979).

Incompatibility (Materials to Avoid): Dissolves, swells, and disintegrates many plastics (*CHRIS 1978).

Hazardous Decomposition or Byproducts: When it decomposes, 1,1-dimethylhydrazine gives off toxic nitrogen compound fumes (*Rumack 1975 to Present).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 364)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Major uses include: chemical synthesis; stabilizer for organic peroxide fuel additives; absorbent for acid gases; photography (*Hawley 1977); base in rocket fuel formulations (*Merck 1983); stabilizer for plant growth regulator (*Clayton and Clayton 1981-82).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources. Do not touch spilled material. Stop leak if this can be done without risk. Use water spray to reduce vapors. Take up small spills with sand or other non-combustible absorbent material and place into containers for later disposal. Dike far ahead of large spills for later disposal (*DOT 1984). Spills also may be removed with an aspirator. Transfer to glass container and neutralize with dilute sulfuric acid. Drain with copious amounts of water (*Rumack 1975 to Present).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

DIMETHYLHYDRAZINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	EXCELLENT/MANY
Butyl/Neoprene	POOR/LIMITED*
CPE	POOR/LIMITED
Chlorobutyl	GOOD/LIMITED
Neoprene	POOR/MANY
Nitrile	POOR/MANY
PVC	POOR/MANY
Teflon	POOR/LIMITED
Viton	POOR/LIMITED
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIMETHYLHYDRAZINE

(57-14-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Clear, colorless liquid.

Odor - Ammonialike.

Commercial Form - 98% pure liquid in drums or tank cars.

Uses - Chemical synthesis, stabilizer for organic peroxide rocket fuel formulations, acid gas absorbent, plant growth regulator, photography.

Materials to Avoid - Oxidizers.

Caution: *Highly flammable. Avoid sources of extreme heat or ignition including sparks or fire. Dimethylhydrazine will emit toxic nitrogen compounds when heated to decomposition.*

Other Names - Asym dimethylhydrazine, Dimazin, 1,1-dimethylhydrazine, UDMH.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, pyridoxine.

DIMETHYLHYDRAZINE

Signs and Symptoms of Acute Dimethylhydrazine Exposure:

Warning: *Effects may be delayed for hours to days. Caution is advised.*

Signs and symptoms of acute exposure to dimethylhydrazine may include eye irritation, facial numbness, facial swelling, and increased salivation. Headache, twitching, seizures, convulsions, and coma may also occur. Gastrointestinal effects include anorexia, nausea, and vomiting. Pulmonary edema and hypotension (low blood pressure) are common. Dimethylhydrazine is toxic to the liver, ruptures red blood cells, and may cause kidney damage. Dermal contact may result in strong skin and mucous membrane irritation.

Emergency Life-Support Procedures:

Acute exposure to dimethylhydrazine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as dimethylhydrazine-resistant sheeting and disposable bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to dimethylhydrazine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to dimethylhydrazine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

DIMETHYLHYDRAZINE

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of dimethylhydrazine is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of dimethylhydrazine may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- STRYCHNINE

CAS Registry Number: 57-24-9

Synonyms: Certox; Dolco Mouse Cereal; Kwik-Kil; Mole Death; Mouse-Nots; Mouse-Rid; Mouse-Tox; Pied Piper Mouse Seed; Ro-Dex; Sanaseed; Strychnos; Strychnidin-10-one; Strychnin

Chemical Formula: $C_{21}H_{22}N_2O_2$

Molecular Weight: 334.40

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mus) 2 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 518°F, 270°C at 5mmHg (*Merck 1983)

Specific Gravity (H_2O=1): 1.36 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): Not Found

Melting Point: 514-554°F, 268-290°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g in 6400 ml (*Merck 1983).

Appearance and Odor: Colorless, transparent crystals or white crystalline powder; odorless (*Osol 1980).

STRYCHNINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.15 mg/m^3 (NIOSH 1987, p. 210)

ACGIH TLV: TWA 0.15 mg/m^3 (ACGIH 1986-87, p. 29)

IDLH: 3 mg/m^3 (NIOSH/OSHA 1978, p. 168)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Not Found
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Super toxic; probable oral lethal dose in humans is less than 5 mg/kg, a taste (less than 7 drops) for a 70 kg (150 lb.) person. It causes violent generalized convulsions. Death results from respiratory arrest as the respiratory muscles are in sustained spasm (*Gosselin 1976). The lowest lethal oral dose reported for humans is 30 mg/kg (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Material may burn but does not ignite readily (*DOT 1984).
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish fire using agent suitable for type of surrounding fire; material itself does not burn or burns with difficulty. Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 482).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated, emits highly toxic fumes (*Sax 1979). Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Osol 1980)

Conditions to Avoid: Protect from light (*Merck 1983)

STRYCHNINE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Material (and its salts) is used for destroying rodents and predatory animals and for trapping fur-bearing animals (*Merck 1983).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53). Avoid breathing dusts, and fumes from burning materials. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 482).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for STRYCHNINE

(57-24-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless, transparent crystals or white crystalline powder.

Odor - None; bitter taste.

Commercial Form - Poisoned baits, usually as colored grain.

Uses - Rodenticide, sedatives, veterinary products.

Other Names - Certox, Kwik-Kil, Mouse-Rid, Mouse-Tox, Ro-Dex, Sanaseed, Strychinos, strychnidin-10-one.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, sodium bicarbonate, pancuronium bromide or curare, succinylcholine.

Signs and Symptoms of Acute Strychnine Exposure:

Warning: *Strychnine may induce convulsions within 15 to 60 minutes following exposure. Caution is advised.*

Respiratory paralysis and arrest are likely to occur following severe exposure to strychnine. Signs and symptoms of acute exposure generally involve excitation of all portions of the central nervous system. Convulsions, bilateral horizontal nystagmus (rapid, synchronous, horizontal oscillations of the eyeballs), agitation, restlessness, apprehension, and abrupt, jerking movements of the extremities may occur.

STRYCHNINE

Victims may also experience stiffness, painful muscle cramping (especially in the legs), and opisthotonos (spasm in which the spine and extremities are bent with convexity forward, the body resting on the head and heels). Vomiting and renal failure, as well as cyanosis (blue tint to skin and mucous membranes) and rhabdomyolysis (destruction of skeletal muscle), may be found.

Emergency Life-Support Procedures:

Acute exposure to strychnine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to strychnine.

   Warning: *Any unnecessary sensory input may induce seizures. Isolate the victims from any avoidable distractions.*

2. RUSH to a health care facility!

3. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to strychnine.

   Warning: *Any unnecessary sensory input may induce seizures. Isolate the victims from any avoidable distractions.*

2. RUSH to a health care facility!

STRYCHNINE

3. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas THOROUGHLY with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

   Warning: *Any unnecessary sensory input may induce seizures. Isolate the victims from any avoidable distractions.*

2. RUSH to a health care facility!

3. DO NOT induce vomiting or attempt to neutralize.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administereing a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHYSOSTIGMINE

CAS Registry Number: 57-47-6

Synonyms: Calabarine; Carbamic Acid, Methyl-, Ester with Eseroline; Erserine; Eserine; Eserolein, Methylcarbamate (Ester); Esromiotin; Ezerin; Physostol; Pyrrolo(2,3-b)indol-5-ol, 1,2,3,3a,8,8a-Hexahydro-1,3a,8-Trimethyl-, Methylcarbamate (Ester), (3aS-cis)-

Chemical Formula: $C_{15}H_{21}N_3O_2$

Molecular Weight: 275.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mus) 4.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 221-223°F, 105-106°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (*Merck 1976)

Appearance and Odor: White, odorless, microcrystalline powder (*Osol 1980)

PHYSOSTIGMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Gilman 1980)
Skin: Yes (*Gilman 1980)
Ingestion: Yes (*Gilman 1980)

Health Hazards (Acute, Delayed, and Chronic): Super toxic. Probable oral lethal dose is less than 5 mg/kg for a 70 kg (150 lb.) person (*Gosselin 1984). Material is a cholinesterase inhibitor. Effects of exposure may involve the respiratory, gastrointestinal, cardiovascular and central nervous systems. Death occurs due to respiratory paralysis or impaired cardiac function. Time to death may vary from 5 minutes to 24 hours, in severely poisoned patients, depending on factors such as the dose and route (*Goodman 1980).

Medical Conditions Generally Aggravated by Exposure: Persons with asthma and/or persons that require drugs containing choline esters are at risk (*Osol 1975).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This is a carbamate pesticide (Hayes 1982, p. 436). As for carbamate pesticides, extinguish fire using agent suitable for type of surrounding fire (material itself burns with difficulty). Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide or dry chemical (Student 1981, p. 104).

Special Fire Fighting Procedures: This is a carbamate pesticide (Hayes 1982, p. 436). As for carbamate pesticides, wear self-contained breathing apparatus when fighting fires (Student 1981, p. 104).

Unusual Fire and Explosion Hazards: It is a slight fire hazard (Sax 1984, p. 2228).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

PHYSOSTIGMINE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Keep from light and heat (*Merck 1976).

Hazardous Decomposition or Byproducts: When heated to decomposition it emits toxic fumes of nitrogen oxides (Sax 1984, p. 2228).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Physostigmine is a carbamate pesticide (Hayes 1982, p. 436). Material is used as a cholinergic (anticholinesterase) agent and as a veterinary medication (*Merck 1976). Listed as a carbamate pesticide in Sections III and VII, however, physostigmine is not registered in the U.S. as such (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This is a carbamate pesticide (Hayes 1982, p. 436). As for other carbamate pesticides, avoid breathing dusts, and fumes from burning materials. Keep upwind. Avoid bodily contact with the material. Wash away any material which may have contacted the body with copious amounts of water or soap and water (*Student 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: General symptoms include: increased secretions, fatigability and generalized weakness, involuntary twitching, severe weakness of skeletal muscles. Symptoms of exposure to material by major organ system: gastrointestinal: lack of appetite, nausea and vomiting, abdominal cramps and diarrhea. Central nervous system: confusion, uncoordination, slurred speech, loss of reflexes, rapid, irregular breathing, generalized convulsions, and coma. Cardiovascular: slowed heart beat resulting in hypotension and fall in cardiac output (*Goodman 1980).

PHYSOSTIGMINE

SECTION IX (continued)

Emergency and First Aid Procedures: Administer artificial respiration and oxygen if needed (Sax 1984, p. 2228). If the victim's skin and hair are contaminated, bathe with soap and water. If the material was ingested, the stomach must be emptied (*Morgan 1976).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPIOLACTONE, beta-

CAS Registry Number: 57-57-8

Synonyms: beta-Propiolactone; 2-Oxetanone; 3-Hydroxypropionic Acid Lactone; 3-Hydroxypropionic Acid, beta-Lactone; 3-Propanolide; 3-Propiolactone; beta-Propionolactone; beta-Proprolactone; Betaprone; BPL; Hydracrylic Acid Beta-Lactone; Hydracrylic Acid, beta Lactone; Propanoic Acid, 3-Hydroxy-,beta-Lactone; Propanolide; Propiolactone; Propionic Acid 3-Hydroxy-beta-Lactone; Propionic Acid, 3-Hydroxy-, beta-Lactone

Chemical Formula: $C_3H_4O_2$

Molecular Weight: 72.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.074 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 324°F, 162°C, decomposes (*Merck 1976)

Specific Gravity (H_2O=1): 1.146 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 3.4 at 25°C (*IARC 1972-1985)

Melting Point: -27°F, -33°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 37% by volume (*Merck 1976)

PROPIOLACTONE, beta-

SECTION II (continued)

Appearance and Odor: A colorless liquid with a slightly sweetish, pungent odor (*Encyc Occupat Health and Safety 1971; *IARC 1972-1985)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 1.5 mg/m^3, (0.5 ppm); STEL 3 mg/m^3,(1 ppm) (ACGIH, 19[illegible] 30)

IDLH: Not Found

Other Limits Recommended: Industrial substance suspect of carcinogenic potential for humans (ACGIH 1984, p. 41).

Routes of Entry: **Inhalation:** Yes (*Sax 1968)
Skin: Yes (Weiss 1980, p. 776)
Ingestion: Yes (*Sax 1968)

Health Hazards (Acute, Delayed, and Chronic): The toxicity potential of this material via inhalation or ingestion is high; may cause death or permanent injury after very short exposures to small quantities (*Sax 1968). It is a carcinogen (Weiss 1980, p. 776).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 70°C (158°F) (no method given) (*Merck 1976)
Flammable Limits:
LEL: 2.9% (*NFPA 1979)
UEL: Not Found

Extinguishing Methods: Alcohol foam (*Sax 1979). Extinguish with water, dry chemical, foam, or carbon dioxide (Weiss 1980, p. 776).

Special Fire Fighting Procedures: Wear air mask, goggles or face shield, rubber gloves, and protective clothing to prevent all skin contact. Cool exposed containers with water (Weiss 1980, p. 776).

Unusual Fire and Explosion Hazards: Containers may explode (Weiss 1980, p. 776). When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2102).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes, stable when stored at 5°C (*Merck 1983)

PROPIOLACTONE, beta-

SECTION V (continued)

Conditions to Avoid: Avoid storing in areas of exposure to the direct rays of the sun and in areas of high fire hazard (*Sax 1968). Tends to polymerize on storage (*IARC 1972-1985).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2102).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Avoid elevated temperatures (Weiss 1980, p. 776).

SECTION VI -- USE INFORMATION

Intermediate in organic synthesis; disinfectant (*Merck 1976); sterilant for blood plasma, tissue grafts, vaccines, enzymes and surgical instruments (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid contact with liquid. Keep people away. Stop discharge (Weiss 1980, p. 776). Avoid inhalation (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
Neoprene	POOR/LIMITED
Nitrile	POOR/LIMITED
PE	POOR/MANY
PVC	POOR/LIMITED
Viton	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

PROPIOLACTONE, beta-

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inhalation causes irritation of nose, throat, and respiratory tract. Contact of liquid with eyes causes irritation and tears. Contact with skin causes irritation and blistering; fluid from blisters may cause additional blistering of adjacent skin. Ingestion causes burns of mouth and stomach (Weiss 1980, p. 776).

Emergency and First Aid Procedures: Get medical attention following all exposures to this compound. In case of inhalation, move victim to fresh air; if breathing has stopped, give artificial respiration. If there has been eye contact, flush eyes with water for at least 15 minutes. In case of skin contact, flush with water (Weiss 1980, p. 776).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHYSOSTIGMINE, SALICYLATE (1:1)

CAS Registry Number: 57-64-7

Synonyms: (SANSS 1983 Synonyms): Eserine Salicylate; Physostol Salicylate; Salicylic Acid, compound with Physostigmine; Benzoic Acid, 2-Hydroxy-, compound with (3aS-cis)-1,2,3,3a,8,8a-Hexahydro-1,3a,8-Trimethylpyrrolo[2,3-b]indol-5-yl Methylcarbamate (1:1)

Chemical Formula: $C_{15}H_{21}N_3O_2 \cdot C_7H_6O_3$

Molecular Weight: 413.52

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 2.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 365-369°F, 185-187°C (Merck 1983, p. 1065)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 gram/75 mL at 25°C (Merck 1983, p. 1065)

Appearance and Odor: Crystal form that turns red on exposure to heat or light (Merck 1983, p. 1065).

PHYSOSTIGMINE, SALICYLATE (1:1)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2228)

Health Hazards (Acute, Delayed, and Chronic): This compound is similar to physostigmine. It is classified as super toxic. The probable oral lethal dose (humans) is less than 5 mg/kg or a taste for a 150 lb. person. It is a cholinesterase inhibitor (Gosselin 1984, p. II-245).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 2228).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PHYSOSTIGMINE, SALICYLATE (1:1)

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This compound is similar to physostigmine (Gosselin 1984, p. II-245). Symptoms include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, sweating, lassitude, weakness, tightness in chest, vision disorders, tearing, ciliary muscle spasm, loss of muscle coordination, slurring of speech, twitching of muscle, difficulty in breathing, bluing of skin, convulsions, coma and death (Gosselin 1984, p. III-89).

Emergency and First Aid Procedures: This compound is similar to physostigmine (Gosselin 1984, p. II-245). Give oxygen and artificial respiration as needed. Wash contaminated areas of the skin with soap and water. Irrigate the eyes with water or saline. Keep patient under constant observation for at least 24 hours (Gosselin 1984, p. III-89).

COMMENTS

Sources with no information:
- Doull 1980
- Clayton and Clayton 1981-82
- NFPA 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLORDANE

CAS Registry Number: 57-74-9

Synonyms: 1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-Hexahydro-4,7-Methanoindene; 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-Hexahydro-4,7-Methylene Indane; 4,7-Methano-1H-Indene, 1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-Hexahydro-; 4,7-Methanoindan, 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-Tetrahydro-; 1068; Aspon-Chlordane; CD 68; Chlor Kil; Chlordane, Liquid (DOT); Chlorindan; Corodan; Dowchlor; ENT 9,932; ENT-9932; HCS 3260; Kypchlor; M 140; M 410; NCI-C00099; Niran; Octa-Klor; Octachloro-4,7-Methanohydroindane; Octachloro-4,7-Methanotetrahydroindane; Octachlorodihydrodicyclopentadiene; Oktaterr; Ortho-Klor; Synklor; TAT Chlor 4; Topiclor; Toxichlor; Velsicol 1068; Belt

Chemical Formula: $C_{10}H_6Cl_8$

Molecular Weight: 409.80

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (cat) 0.1 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 347°F, 175°C at 2 mmHg (*Sunshine 1969)

Specific Gravity (H_2O=1): 1.56-1.57 at 25°C/0°C (*Merck 1983)

Vapor Pressure (mmHg): 0.00001 at 25°C (*Sunshine 1969)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

CHLORDANE

SECTION II (continued)

Solubility in Water: Insoluble (*Merck 1983)

Appearance and Odor: Amber viscous liquid with an aromatic, slightly pungent odor (*Merck 1983, *CHRIS 1978)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Air: TWA 0.5 mg/m^3 (skin) (NIOSH 1987)

ACGIH TLV: 0.5 mg/m^3 (ACGIH 1986-87)

IDLH: 500 mg/m^3 (*Clayton and Clayton 1981-82)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Gosselin 1984, pp. III-108-109)
Skin: Yes -- More toxic to humans than by oral administration (Gosselin 1984, pp. III-108-109)
Ingestion: Yes (Gosselin 1984, pp. III-108-109)

Health Hazards (Acute, Delayed, and Chronic): Fatal oral dose to adult humans is between 6 and 60 g with onset of symptoms within 45 minutes to several hours after ingestion, although symptoms have occurred following very small doses either orally or by skin exposure. Some reports of delayed development of liver disease, blood disorders and upset stomach. Chlordane is considered to be borderline between a moderately and highly toxic substance (Gosselin 1984, pp. III-108-109).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Flammable/combustible (*DOT 1984)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, and foam. Large fires: water spray, fog, or foam. Move containers from fire area if it can be done without risk. Cool containers that are exposed to flames with water from the side until well after fire is out (*DOT 1984).

Special Fire Fighting Procedures: Isolate hazard area and deny entry. Stay upwind. Wear positive pressure breathing apparatus and special protective clothing. Isolate for 1/2-mile in all directions if tank car or truck is involved in the fire (*DOT 1984).

Unusual Fire and Explosion Hazards: Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Run-off to sewers may create fire or explosion hazard. Containers may explode in heat of fire. Vapors are toxic indoors

CHLORDANE

SECTION IV (continued)

and outdoors (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Verschueren 1983, pp. 380-381)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Loses chlorine in presence of alkaline reagents; should not be formulated with any solvent, carrier, diluent or emulsifier which has alkaline reaction (*Merck 1983).

Hazardous Decomposition or Byproducts: Chlordane degrades under natural environmental conditions to photoisomers, such as photo-cis- chlordane, which are more toxic to certain animals than chlordane and also showed higher bioaccumulation (*Khan et al. 1970).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

As of 1983, the only use in USA is for termite control (*IARC 1972-1985). Previously used as agricultural home and garden pesticide or insecticide (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Shut off ignition sources. Eliminate all smoking or flames in hazard area. Do not touch spilled material. Use water spray to reduce vapors. Stay upwind. Small spills: take up with sand or other noncombustible absorbent material, place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CHLORDANE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	GOOD/LIMITED**
Nitrile	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Increased sensitivity to stimuli, tremors, muscular incoordination, and convulsions with or without coma (Gosselin 1984, pp. III-108-109).

Emergency and First Aid Procedures: Move victim to fresh air and give artificial respiration if indicated. Remove and isolate contaminated clothing and shoes at site. If exposure to skin or eyes, flush with running water for at least 15 minutes. Try to keep victim quiet. Effects may be delayed so keep victim under observation (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENOXARSINE, 10,10'-OXYDI-

CAS Registry Number: 58-36-6

Synonyms: (SANSS 1983 Synonyms) 10H-Phenoxarsine, 10,10'-oxybis; Bis(Phenoxarsin-10-yl)Ether; Bis(10-Phenoxarsinyl) Oxide; Bis(10-Phenoxarsyl) Oxide; Estabex ABF; OBPA; SA 546; DID 47

Chemical Formula: $C_{24}H_{16}As_2O_3$ (Merck 1983, p. 998)

Molecular Weight: 502.23 (Merck 1983, p. 998)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 24 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 363-365°F, 184-185°C (Merck 1983, p. 998)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (5 ppm at 20°C) (Merck 1983, p. 998)

Appearance and Odor: Colorless crystals (Merck 1983, p. 998)

PHENOXARSINE, 10,10'-OXYDI-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.010 mg/m^3 (Arsenic and Compounds) (NIOSH 1984, p. 661)

ACGIH TLV: Air: TWA 0.2 mg (Arsenic)/m^3 (ACGIH 1984, p. 10)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Arsenic Compounds) (Sax 1984, p. 320)
Skin: Yes (Non-Specific -- Arsenic Compounds) (Sax 1984, p. 320)
Ingestion: Yes (Non-Specific -- Arsenic Compounds) (Sax 1984, p. 320)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Arsenic Compounds) Arsenic compounds are acutely poisonous by ingestion. Ingestion or inhalation may result in chronic poisoning. Arsenic compounds are recognized carcinogens of the skin, lungs, and liver (Sax 1984, p. 320).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Arsenic Compound, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Arsenic Compound, Solid, n.o.s.) Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: (Non-Specific -- Arsenic Compounds) When heated to decomposition, it emits highly toxic fumes of arsenic (Sax 1984, p. 320).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

PHENOXARSINE, 10,10'-OXYDI-

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used primarily for fungicidal and bactericidal protection of plastics (Merck 1983, p. 998).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Arsenic Compound, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Arsenic Compounds) Ingestion causes nausea, vomiting, and diarrhea. In severe cases, there may be bloody vomitus and stools and the victim may suffer collapse and shock with weak, rapid pulse, cold sweats, coma, and death. Symptoms of chronic poisoning may include loss of appetite, cramps, nausea, constipation or diarrhea, jaundice, itching and pigmentation of the skin (Sax 1984, p. 320).

PHENOXARSINE, 10,10'-OXYDI-

SECTION IX (continued)

Emergency and First Aid Procedures: (Non-Specific -- Arsenic Compound, Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- LINDANE

CAS Registry Number: 58-89-9

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 1,000): Cyclohexane, 1,2,3,4,5,6-Hexachloro-, Gamma-Isomer; Aalindan; Aficide; Agrisol G-20; Agrocide; Agrocide 2; Agrocide 7; Agrocide 6G; Agrocide III; Agrocide WP; Agronexit; Ameisenatod; Ameisenmittel Merck; Aparasin; Aphtiria; Aplidal; Arbitex; BBH; Ben-Hex; Bentox 10; Benzene Hexachloride-gamma-isomer; gamma-Benzene Hexachloride; Bexol; BHC; gamma-BHC; Celanex; Chloresene; Codechine; DBH; Detmol-Extrakt; Detox 25; Devoran; Dol Granule; Drill Tox-Spezial Aglukon; Ent 7,796; Entomoxan; Exagama; Forlin; Gallogama; Gamacid; Gamaphex; Gamene; Gammahexa; Gammahexane; Gammalin; Gammalin 20; Gammaterr; Gammex; Gammexane; Gammopaz; Gexane; HCCH; HCH; gamma-HCH; Heclotox; Hexa; Hexachloran; gamma-Hexachloran; Hexachlorane; gamma- Hexachlorane; gamma-Hexachlorobenzene; 1-alpha,2-alpha,3-beta,4-alpha, 5-alpha,6-beta-Hexachlorocyclohexane; gamma-Hexachlorocyclohexane; gamma-1,2,3,4,5,6-Hexachlorocyclohexane; Hexachlorocyclohexane, gamma-Isomer; 1,2,3,4,5,6-Hexachlorocyclohexane, gamma-Isomer; Hexatox; Hexaverm; Hexicide; Hexyclan; HGI; Hortex; Inexit; Isotox; Jacutin; Kokotine; Kwell; Lendine; Lentox; Lidenal; Lindafor; Lindagam; Lindagrain; Lindagranox; gamma-Lindane; Lindane (DOT); Lindapoudre; Lindatox; Lindosep; Lintox; Lorexane; Milbol 49; Mszychol; NCI-C00204; NEO-Scabicidol; Nexen FB; Nexit; Nexit-Stark; Nexol-E; Nicochloran; Novigam; Omnitox; Ovadziak; Owadzlak; Pedraczak; Pflanzol; Quellada; Sang gamma; Silvanol; Spritz-Rapidin; Spruehpflanzol; Streunex; Tap 85; TRI-6; Viton

Chemical Formula: $C_6H_6Cl_6$ (Weast 1979, p. C-262)

Molecular Weight: 290.83 (Weast 1979, p. C-262)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 25 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

LINDANE

SECTION II (continued)

Boiling Point: 614°F, 323.4°C (Weast 1979, p. C-262); Decomposes (NIOSH/OSHA 1978, p. 120)

Specific Gravity (H_2O=1): 1.9 (DASE 1980, p. 529)

Vapor Pressure (mmHg): 0.0000094 at 20°C (Merck 1983, p. 789)

Melting Point: 234.5°F, 112.5°C (Weast 1979, p. C-262)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1979, p. C-262)

Appearance and Odor: Colorless solid with a musty odor; pure material is odorless (NIOSH/OSHA 1978, p. 120).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.5 mg/m^3 (NIOSH/OSHA 1978, p. 120)

ACGIH TLV: TWA 0.5 mg/m^3 (ACGIH 1986)

IDLH: 1,000 mg/m^3 (NIOSH/OSHA 1978, p. 120)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Gosselin 1984, p. III-240)
Skin: Yes (Gosselin 1984, p. III-240)
Ingestion: Yes (Gosselin 1984, p. III-240)

Health Hazards (Acute, Delayed, and Chronic): Lindane is a stimulant of the nervous system, causing violent convulsions that are rapid in onset and generally followed by death or recovery within 24 hours (Hayes 1982, p.218). The probable human oral lethal dose is 50-500 mg/kg, or between 1 teaspoon and 1 ounce for a 150-lb (70 kg) person (Gosselin 1984, p. II-286).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use dry chemical, carbon dioxide, water spray, or foam for small fires. Use water spray, fog, or foam for large fires. Move container from fire area if this can be done without risk. Use water to

LINDANE

SECTION IV (continued)

keep fire-exposed containers cool (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Wear positive pressure breathing apparatus and special protective clothing. Fight fire from maximum distance, dike fire control water for later disposal (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, this compound emits toxic fumes of chlorine, hydrochloric acid, and phosgene (Sax 1984, p. 366).

NFPA Flammability Rating: 1 (solution); 0 (dry)

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Thermal decomposition products may include chlorine, hydrochloric acid, and phosgene (Sax 1984, p. 366).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Pesticide (Hawley 1981, p. 617) and scabicide (Hayes 1982, p. 221).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material. Sweep or shovel material into a clean, dry container. Carefully collect remainder (DASE 1980, p. 529; DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

LINDANE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED**
Butyl/Neoprene	POOR/LIMITED**
CPE	POOR/LIMITED**
Neoprene	POOR/LIMITED**
Nitrile	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Contact with eyes or skin may produce irritation (DASE 1980, p. 529). Vomiting, faintness, tremor, restlessness, muscle spasms, unsteady gait, and convulsions may occur as a result of exposure. Elevated body temperature and pulmonary edema have been reported in children. Coma, respiratory failure and death can result. Exposure to vapors of this compound or its thermal decomposition products may lead to headache, nausea, vomiting, and irritation of the eyes, nose, and throat (Gosselin 1984, pp. III-240, 241).

Emergency and First Aid Procedures: 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 the skin is of extreme importance. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effect may be delayed; keep victim under observation (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENYLHYDRAZINE HYDROCHLORIDE

CAS Registry Number: 59-88-1

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 457): Hydrazine, Phenyl-, Hydrochloride; Hydrazine, Phenyl-, Monohydrochloride; Phenylhydrazine Monohydrochloride; Phenylhydrazinium Chloride

Chemical Formula: $C_6H_8N_2 \cdot HCl$

Molecular Weight: 144.62

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rabbit) 25 mg/kg (*NIOSH/RTECS 1985).

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not pertinent; it decomposes (Weiss 1980, p. 744)

Specific Gravity (H_2O=1): Greater than 1 at 20°C (Weiss 1980, p. 744)

Vapor Pressure (mmHg): Not Found

Melting Point: 469-475°F, 243-246°C (Merck 1983, p. 1051)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble (Merck 1983, p. 1051)

Appearance and Odor: White to tan solid; weak aromatic odor (Weiss 1980, p. 744).

PHENYLHYDRAZINE HYDROCHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Occupational exposure to hydrazines recommended standard: ceiling 0.6 mg/m^3/2 hours (Air) (Sax 1984, p. 2190).

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 744)
Skin: Yes (Weiss 1980, p. 744)
Ingestion: Yes (Weiss 1980, p. 744)

Health Hazards (Acute, Delayed, and Chronic): This material is poisonous if swallowed or if fumes are inhaled. Dust is irritating to eyes, nose, and throat. Phenylhydrazine is a chronic poison (Weiss 1980, p. 744). Phenylhydrazine is an industrial substance suspect of carcinogenic potential for humans (ACGIH 1983, p. 43).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Combustible (Weiss 1980, p. 744)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use water, foam, dry chemical, or carbon dioxide (Weiss 1980, p. 744).

Special Fire Fighting Procedures: Wear goggles and self-contained breathing apparatus (Weiss 1980, p. 744).

Unusual Fire and Explosion Hazards: Toxic and irritating hydrogen chloride and oxides of nitrogen may be produced in fire (Weiss 1980, p. 744).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 744)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): May be corrosive to metals (Weiss 1980, p. 744).

PHENYLHYDRAZINE HYDROCHLORIDE

SECTION V (continued)

Hazardous Decomposition or Byproducts: Hydrogen chloride and oxides of nitrogen (Weiss 1980, p. 744).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 744)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Hemolytic (Merck 1983, p. 1051).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid contact with solid and dust. Restrict access. Disperse and flush (Weiss 1980, p. 744). (Non-Specific -- Phenylhydrazine) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Ingestion or inhalation of fumes can cause nausea, jaundice, anorexia, and blood clots. It may also cause anemia and liver injury. Contact with eyes causes irritation. Contact with skin causes irritation and dermatitis. Inhalation of dust can cause coughing and difficult breathing (Weiss 1980, p. 744).

Emergency and First Aid Procedures: Move victim to fresh air. Remove contaminated clothing and shoes. For ingestion, give a large amount of water; induce vomiting. If eyes are exposed, flush with water for at least 15 minutes. If skin is exposed, flush with water (Weiss 1980, p. 744).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL HYDRAZINE

CAS Registry Number: 60-34-4

Synonyms: 1-Methylhydrazine; Hydrazine, Methyl-; Hydrazomethane; MMH; Monomethylhydrazine; UN 1244

Chemical Formula: CH_6N_2

Molecular Weight: 46.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.105 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 190°F, 87.5°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.874 at 25°C (*Merck 1983)

Vapor Pressure (mmHg): 49.6 at 25°C (*Sunshine 1969)

Melting Point: -62.3°F, -52.4°C (*Merck 1983)

Vapor Density (AIR=1): 1.6 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible with water (*Merck 1983)

Appearance and Odor: It is a colorless liquid (*Sax 1979) with an odor characteristic of short-chain, organic amines, or ammonia-like (*Merck 1983, *Clayton and Clayton 1981-82).

METHYL HYDRAZINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 0.35 mg/m^3 (skin) (*NIOSH/RTECS 1985)

ACGIH TLV: Ceiling 0.35 mg/m^3 (skin) (*ACGIH 1983)

IDLH: 5 ppm (*Encyc Occupat Safety and Health 1983)

Other Limits Recommended: Methyl hydrazine is a suspected human carcinogen with a NIOSH recommended ceiling concentration of 0.08 mg/m^3/2 hour (*ACGIH 1984 and *NIOSH 1985). SPEGL 0.24 ppm (60 minutes) (NRC 1985b, pp. 23-36).

Routes of Entry: **Inhalation:** Yes (*Clayton and Clayton 1981-82)
Skin: Yes (*Clayton and Clayton 1981-82)
Ingestion: Yes (*Clayton and Clayton 1981-82)

Health Hazards (Acute, Delayed, and Chronic): Methyl hydrazine vapors are extremely toxic and the liquid is corrosive to skin. Methyl hydrazine is the strongest convulsant and the most toxic of methyl-substituted hydrazine derivatives (*Clayton and Clayton 1981-82). It is more toxic than hydrazine (*NFPA 1978). At high doses, it is a strong central nervous system poison that can lead to convulsions and death (*Encyc Occupat Health and Safety 1971)

Medical Conditions Generally Aggravated by Exposure: Skin rash may be aggravated by skin exposure (*Encyc Occupat Health and Safety 1971).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 70°C (OC) (*Merck 1983)
Flammable Limits:
LEL: 2.5% (Sax 1984, p. 1858)
UEL: 97% (Sax 1984, p. 1858)

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray, and foam. For large fires, use water spray, fog, or foam. Keep unnecessary people away and isolate the hazardous area. Stay upwind and keep out of low-lying areas (DOT 1984, Guide 28). Fire exposed containers should be kept cool with water. Use water spray to disperse vapors and protect men attempting to stop a leak which has not ignited (*NFPA 1978). Move container from fire area if it can be done without risk (*DOT 1984).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special (full) protective clothing. No skin surface should be exposed (*NFPA 1978). Isolate area for 1/2-mile in all directions if a tank car or truck is involved in a fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Extremely flammable; ignites spontaneously under almost all normal temperature conditions (*NFPA 1978). Water used to extinguish a fire may cause pollution and should be diked for

METHYL HYDRAZINE

SECTION IV (continued)

later disposal (DOT 1984, Guide 28). Water may be ineffective in extinguishing fires due to the chemical's low flash point. Because of the wide flammability limits, low flash point, and reignition hazard, dry chemicals, carbon dioxide, water spray, and foam may not be as effective as water dilution of fire area. The vapor is heavier than air; thus it may accumulate sufficiently to flash back (*NFPA 1978).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Heat or flame should be avoided because chemical is extremely flammable and explosive (*Sax 1979).

Incompatibility (Materials to Avoid): Ignites spontaneously in air when in contact with porous materials (e.g., earth, asbestos, wood, or cloth) (*NFPA 1978). Also ignites spontaneously on contact with strong oxidizing agents (e.g., fluorine, chlorine trifluoride, fuming nitric acid, and nitrogen tetroxide) (*Merck 1983).

Hazardous Decomposition or Byproducts: Methylhydrazine fires produce irritating nitrogen oxides (*NFPA 1978).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a chemical intermediate and solvent (*ACGIH 1980). Also used as a component of rocket propellants (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

In the case of a spill or leak, shut off ignition sources, and extinguish or disallow flares, smoking, or flames in the hazard area. Do not touch the spilled material, and stop leak if it can be done without risk. Use water spray to reduce vapors. For small spills, take up the chemical with sand or other noncombustible absorbent material and place it in containers for later disposal. For large spills, dike far ahead for later disposal (*DOT 1984).

METHYL HYDRAZINE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/MANY
CPE	POOR/LIMITED
Chlorobutyl	GOOD/LIMITED
PVC	POOR/LIMITED
Teflon	POOR/MANY
Viton	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for METHYL HYDRAZINE

(60-34-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless liquid.

Odor - Ammonialike.

Uses - Chemical intermediate, solvent, rocket propellant.

Materials to Avoid - Porous materials, acids, oxidizers.

Caution: *Extremely flammable. Avoid sources of extreme heat or ignition including sparks or fire. Methyl hydrazine may spontaneously self-ignite.*

Other Names - Hydrazomethane, 1-methylhydrazine, MMH, monomethylhydrazine, UN 1244.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, pyridoxine.

Signs and Symptoms of Acute Methyl Hydrazine Exposure:

Warning: *Symptoms may be delayed from hours to days. Caution is advised.*

Symptoms of acute exposure to methyl hydrazine may include facial numbness, facial swelling, and increased salivation. Headache, twitching, seizure, convulsions, and coma may also occur. Gastrointestinal signs and symptoms include anorexia, nausea, and vomiting. Pulmonary edema and hypotension (low blood pressure) are common.

METHYL HYDRAZINE

Methyl hydrazine is toxic to the liver, ruptures red blood cells, and may cause kidney damage. Contact with the skin, eyes, or mucous membranes may result in severe irritation and permanent damage.

Emergency Life-Support Procedures:

Acute exposure to methyl hydrazine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methyl hydrazine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methyl hydrazine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

METHYL HYDRAZINE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- STRYCHNINE, SULFATE

CAS Registry Number: 60-41-3

Synonyms: (NIOSH/RTECS Synonyms 1983, Volume 3, p. 650) Strychnine, Sulfate (2:1); Strychnine Sulfate; Strychnidin-10-one, Sulfate (2:1)

Chemical Formula: $C_{21}H_{22}N_2O_2 \cdot 1/2\ H_2O_4S$

Molecular Weight: 383.49

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 5 mg/kg (*NIOSH/RTECS 1985).

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 392°F, 200°C with decomposition (Merck 1983, p. 1269)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g dissolves in 35 mL, 7 mL boiling water (Merck 1983, p. 1269)

Appearance and Odor: Colorless, odorless, very bitter crystals; white crystalline powder (Merck 1983, p. 1269).

STRYCHNINE, SULFATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 1156)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2473)

Health Hazards (Acute, Delayed, and Chronic): Violent poison! (Merck 1983, p. 1269). Lowest published lethal dose orally in humans is 30 mg/kg (Weiss 1980, p. 1156).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Strychnine and Salts) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Strychnine and Salts) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of sulfur oxides and nitrogen oxides (Sax 1984, p. 2473).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Protect from light (Merck 1983, p. 1269).

Incompatibility (Materials to Avoid): Alkalies, alkali carbonates and

STRYCHNINE, SULFATE

SECTION V (continued)

bicarbonates, benzoates, dichromates, bromides, iodides, tannic and picric acids, salicylates, borax, gold chloride and other alkaloid precipitants, piperazine, potassium-mercuric iodide (Merck 1983, p. 1269).

Hazardous Decomposition or Byproducts: Emits very toxic fumes of sulfur oxides and nitrogen oxides when heated to decomposition (Sax 1984, p. 2473).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Has been used as a tonic and stimulant in veterinary medicine (Merck 1983, p. 1269). Registered as a rodenticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Strychnine and Salts) Do not touch 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for STRYCHNINE SULFATE

(60-41-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless crystals or white, crystalline powder.

Odor - None; bitter taste.

Uses - Rodenticide, tonic and stimulant in veterinary medicine.

Other Names - Kilmice; Mole-Nots; Mouse-Nots; strychnidin-10-one, sulfate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, sodium bicarbonate, pancuronium bromide or curare, succinylcholine.

Signs and Symptoms of Acute Strychnine Sulfate Exposure:

Warning: *Strychnine sulfate may induce convulsions within 15 to 60 minutes following exposure. Caution is advised. Vital signs should be monitored closely.*

Signs and symptoms of acute exposure to strychnine sulfate generally involve excitation of all portions of the central nervous system. Convulsions, bilateral horizontal nystagmus (rapid, synchronous, horizontal oscillations of the eyeballs), agitation, restlessness, apprehension, and abrupt, jerking movements of the extremities may occur.

STRYCHNINE SULFATE

Victims may also experience stiffness, painful muscle cramping (especially in the legs), opisthotonos (spasm in which the spine and extremities are bent with convexity forward, the body resting on the head and heels), and vomiting. Respiratory paralysis and arrest are likely to occur following severe exposure to strychnine sulfate. Cyanosis (blue tint to skin and mucous membranes), rhabdomyolysis (destruction of skeletal muscle), and renal failure may also be found.

Emergency Life-Support Procedures:

Acute exposure to strychnine sulfate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to strychnine sulfate.

   Warning: *Any unnecessary sensory input may induce seizures. Isolate the victims from any avoidable distractions.*

2. RUSH to a health care facility!

3. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to strychnine sulfate.

   Warning: *Any unnecessary sensory input may induce seizures. Isolate the victims from any avoidable distractions.*

2. RUSH to a health care facility!

3. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

STRYCHNINE SULFATE

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. THOROUGHLY wash exposed skin areas with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

   Warning: *Any unnecessary sensory input may induce seizures. Isolate the victims from any avoidable distractions.*

2. RUSH to a health care facility!

3. DO NOT induce vomiting or attempt to neutralize.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETHOATE

CAS Registry Number: 60-51-5

Synonyms: 8014 Bis HC; Acetic Acid, O,O-Dimethyldithiophosphoryl-, N-Monomethylamide Salt; American Cyanamid 12,880; BI 58; CL 12880; Cygon; Cygon 4E; Cygon Insecticide; Daphene; De-Fend; Demos-L40; Dimethogen; Dimeton; Dimevur; ENT 24650; Experimental Insecticide 12,880; FIP; Fosfotox; Fosfotox R; Fosfotox R 35; Fostion MM; Lurgo; NCI-C00135; O,O-Dimethyl S-(N-Methyl- carbamoylmethyl) Dithiophosphate; O,O-Dimethyl S-(N-Methylcarbamoylmethyl) Phosphorodithioate; O,O-Dimethyl S-Methylcarbamoylmethyl Phosphorodithioate; O,O-Dimethyldithiophosphorylacetic Acid, N-Monomethylamide Salt; PEI 75; Perfecthion; Perfekthion; Phosphamid; Phosphamide; Phosphorodithioic Acid O,O-Dimethyl Ester, Ester With 2-Mercapto-N-Methylacetamide; Phosphorodithioic Acid, O,O-Dimethyl S-(2-(Methylamino)-2-Oxoethyl) Ester; Racusan; Rogor; Rogor 20L; Rogor 40; Rogor L; Rogor P; Roxion; S-Methylcarbamoylmethyl O,O-Dimethyl Phosphorodithioate; Sinoratox; Systoate

Chemical Formula: $C_5H_{12}NO_3PS_2$

Molecular Weight: 229.28

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mammal) 15 mg/kg (*NIOSH/RTECS 1985).

TPQ: 500/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.277 at 65°C (*Merck 1983)

Vapor Pressure (mmHg): 0.0000085 at 77°F (*Worthing 1979)

Melting Point: 125°F, 52°C (*Merck 1983), 113-117°F, 45-47°C for technical product (Worthing 1983)

DIMETHOATE

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 2-3 g/100 ml (*Spencer 1982)

Appearance and Odor: A white crystalline solid (*Spencer 1982) with a camphor-like odor (*Worthing 1979); white to greyish crystals for technical product (Worthing 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: ADI 0.02 mg/kg (*Hayes 1975).

Routes of Entry: **Inhalation:** Yes (*Encyc Occupat Health and Safety 1983)
Skin: Yes (*Encyc Occupat Health and Safety 1983)
Ingestion: Yes (*Encyc Occupat Health and Safety 1983)

Health Hazards (Acute, Delayed, and Chronic): Very toxic; the probable oral lethal dose in humans is between 50-500 mg/kg, or between 1 teaspoon and 1 ounce for a 70 kg (150 lb.) person. Dimethoate is a cholinesterase inhibitor, meaning it affects the central nervous system. Death is due to respiratory arrest arising from failure of respiratory center, paralysis of respiratory muscles, intense bronchoconstriction or all three (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 124°F (CC) (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material is an organophosphate insecticide (*White-Stevens 1971; *Worthing 1979). Methods for organophosphorus pesticides are as follows. Small fires: dry chemical, carbon dioxide, water spray, and foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

DIMETHOATE

SECTION IV (continued)

Special Fire Fighting Procedures: Procedures for organophosphorus pesticides are as follows. Dike fire control water for later disposal, do not scatter the material. Wear positive pressure breathing apparatus and protective clothing. Fight fire from maximum distance (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: As with other organophosphorus pesticides, container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Spencer 1973)

Conditions to Avoid: The temperature of storage should not exceed 70-80°F. Keep away from sources of heat, flames, or spark-generating equipment (*Farm Chemicals Handbook 1983). Unstable in alkaline solution. Hydrolyzed by aqueous alkali. Stable in aqueous solutions. The compound is stable for 2 years under environmental conditions if stored in undamaged, original containers (*Spencer 1973).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Dimethoate is a contact and systemic organophosphate insecticide effective against a broad range of insects and mites when applied on a wide range of crops (*Worthing 1979; *SRI; *White-Stevens 1971). It has not been produced in the U.S. since 1982 (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Dimethoate is an organophosphate insecticide (*White-Stevens 1971; *Worthing 1979). Precautions for organophosphorus pesticides include the following. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material

DIMETHOATE

SECTION VII (continued)

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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIMETHOATE

(60-51-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White crystalline solid.

Odor - Camphorlike (familiar, fragrant, penetrating).

Commercial Form - White to greyish crystals.

Use - Systemic insecticide-acaricide.

Material to Avoid - Alkali.

Other Names - American Cyanamid 12,880; Cygon; Daphene; Dimet, Dimethogen, O,O-dimethyl S-methylcarbamoylmethyl phosphorodithioate; Dimeton, Dimevur, FIP, Fosfotox, Fostion MM, Lurgo, Perfekthion, Phosphamide, Racusan, Rogor, Roxion, Sinoratox, Systoate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Dimethoate Exposure:

Note: Dimethoate is a cholinesterase inhibitor.

Acute exposure to dimethoate may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

DIMETHOATE

The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) and chest pain may be noted. Hypertension (high blood pressure) is not uncommon. Respiratory effects may include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

Emergency Life-Support Procedures:

Acute exposure to dimethoate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to dimethoate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to dimethoate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

DIMETHOATE

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

4. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

5. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENYLMERCURY ACETATE

CAS Registry Number: 62-38-4

Synonyms: (Acetoxymercuri)Benzene; Acetic Acid, Phenylmercury Deriv; Acetoxyphenylmercury; Agrosan GN 5; Algimycin; Antimucin WDR; Bufen; Ceresan Universal; Contra Creme; Dyanacide; Femma; FMA; Fungitox OR; Gallotox; HL-331; Hostaquick; Kwiksan; Leytosan; Liquiphene; Mercury(II) Acetate, Phenyl-; Mercury, (Acetato)Phenyl-; Mersolite; Mersolite 8; Metasol 30; Norforms; Phenmad; Phenomercuric Acetate; Phenylmercuriacetate; Phenylmercuric Acetate; Phix; PMA; PMAC; PMacetate; PMAL; PMAS; Programin; Purasan-SC-10; Puraturf 10; Quicksan 20; Sanitized SPG; SC-110; Shimmerex; Spor-Kil; TAG; Trigosan; Ziarnik; Mercury,(Acetato-O)Phenyl-

Chemical Formula: $C_8H_8HgO_2$

Molecular Weight: 336.75

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 22 mg/kg (*NIOSH/RTECS 1985).

TPQ: 500/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): In Mercury Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.000009 at 35°C (*Worthing 1979)

Melting Point: 300°F, 149°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

PHENYLMERCURY ACETATE

SECTION II (continued)

Solubility in Water: 1 g/180 ml (*Osol 1980); soluble in about 600 parts water (Merck 1983, p. 1052)

Appearance and Odor: White to creamy white crystalline powder or small white prisms or leaflets. Odorless (*Osol 1980).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 mg/m^3 (skin) (*ACGIH 1983)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Hawley 1977)
Skin: Yes (*Hawley 1977)
Ingestion: Yes (*Hawley 1977)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic. The probable oral lethal dose for humans is 5-50 mg/kg, between 7 drops and 1 teaspoonful for a 70 kg (150 lb.) person (Gosselin 1984, p. II-137).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Above 100°F (OC) (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use dry chemical, foam, or carbon dioxide on solution. Use water as necessary, but run-off should be limited and controlled to prevent it from entering streams or water supplies (*NFPA 1978).

Special Fire Fighting Procedures: Materials are extremely hazardous to health, but areas may be entered with extreme care. Full protective clothing, including self-contained breathing apparatus, rubber gloves, boots and bands around legs, arms, and waist should be provided. No skin should be exposed (*NFPA 1978).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases (*DOT 1984).

NFPA Flammability Rating: 1 (powder); 2 (solution)

PHENYLMERCURY ACETATE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Phenylmercuric ion is incompatible with halides, with which precipitates are formed (*Osol 1980).

Hazardous Decomposition or Byproducts: When heated to decomposition, very toxic mercuric fumes may be given off (Sax 1984, p. 100).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as an antiseptic, fungicide, herbicide; mildewcide for paints; slimicide in paper mills (*Hawley 1977). It was also used in contraceptive gels and foams (*Osol 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms arising from acute exposure may occur at varying intervals up to several weeks following exposure. Ingestion of mercurial fungicide treated grain resulted in gastro-intestinal irritation with nausea, vomiting, abdominal pain, and diarrhea. Alkylmercurials produce severe neurologic toxicity, such as loss of feeling

PHENYLMERCURY ACETATE

in lips, tongue, and extremities, confusion, hallucinations, irritability, sleep disturbances, staggering walk, memory loss, slurred speech, auditory defects, emotional instability, and inability to concentrate. It is also a strong skin irritant; erythema and blistering may result 6-12 hours after exposure (*Rumack 1975 to Present). Phenylmercury acetate, at sufficient concentration, is expected to be injurious to the eye externally (*Grant 1974).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin and eyes with running water for at least 15 minute Speed in removing material from the skin is of extreme importance. Remo and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep vict under observation (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ANILINE

CAS Registry Number: 62-53-3

Synonyms: Aminobenzene; Aminophen; Aniline Oil; Anyvim; Benzenamine; Benzene, Amino-; Benzidam; Blue Oil; CI 76000; CI Oxidation Base 1; Cyanol; Krystallin; Kyanol; NCI-C03736; Phenylamine

Chemical Formula: C_6H_7N

Molecular Weight: 93.12

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000 (pounds)

RQ: 5,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 363-367°F, 184-186°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.022 at 20°C/20°C (*Merck 1976)

Vapor Pressure (mmHg): 0.67 at 25°C (*IARC 1972-85)

Melting Point: 21°F, -6.3°C (*Weast 1979)

Vapor Density (AIR=1): 3.22 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 gram in 28.6 mL water (*Merck 1976)

ANILINE

SECTION II (continued)

Appearance and Odor: Brown oily liquid (*Student 1981) with an aromatic amine-like odor (*CHRIS 1978); colorless when freshly distilled (Merck 1983, p. 96)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Air: TWA 5 ppm (19 mg/m^3) (skin) (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 2 ppm (10 mg/m^3) (skin); STEL 5 ppm (20 mg/m^3) (skin) (*ACGIH 1982)

IDLH: 100 ppm (NIOSH/OSHA 1978, p. 46)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Merck 1976)
Skin: Yes (*Merck 1976)
Ingestion: Yes (*Merck 1976)

Health Hazards (Acute, Delayed, and Chronic): It is classified as very toxic. Probable oral lethal dose in humans is 50-500 mg/kg for a 150 lb. person. Aniline poisoning is characterized by methemoglobin formation in the blood and resulting cyanosis or blue skin (*Gosselin 1976). The formation of methemoglobin interferes with the oxygen-carrying capacity of the blood (Doull 1980, p. 319). The approximate minimum lethal dose for a 150 lb. human is 10 grams (*Arena 1979). Serious poisoning may result from ingestion of 0.25 mL (*Merck 1976).

Medical Conditions Generally Aggravated by Exposure: People at special risk include individuals with glucose-6-phosphate-dehydrogenase deficiency (*Arena 1979) and those with liver and kidney disorders, blood diseases, or a history of alcoholism (*General Electric Co. 1978, MSDS #407).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 158°F, 70°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 1.3% (*NFPA 1978)
UEL: 20-25% (*Sax 1975)

Extinguishing Methods: Use water spray, dry chemical, foam or carbon dioxide. Use water to keep fire-exposed containers cool (*NFPA 1984).

Special Fire Fighting Procedures: Fight fire from maximum distance. Dike fire control water for later disposal and do not scatter material (*DOT 1984). If a leak or spill has not ignited, use water spray to control vapors (*NFPA 1978). Wear self-contained breathing apparatus with a full face piece operated in pressure-demand or other positive pressure mode (*NIOSH/OSHA 1981) and special protective clothing (*DOT 1984).

ANILINE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Combustion can produce toxic fumes including nitrogen oxides and carbon monoxide (*General Electric Co. 1978, MSDS #407). Aniline vapor forms explosive mixtures with air (*ITI 1982).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Heating (*Sax 1975)

Incompatibility (Materials to Avoid): It is incompatible with strong oxidizers and strong acids (NIOSH/OSHA 1978, p. 46) and a number of other materials (*Bretherick 1979; *ITI 1982; *Sax 1984).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes (*Sax 1975). These fumes may include nitrogen oxides and carbon monoxide (General Electric Co. 1978, MSDS #407).

Hazardous Polymerization: **May Occur:** Yes (*IARC 1972-85)
May Not Occur:

Conditions to Avoid: Polymerizes to a resinous mass (*IARC 1972-85).

SECTION VI -- USE INFORMATION

Manufacture of dyes, resins, varnishes, perfumes, shoe blacks, vulcanizing rubber; solvent (*Merck 1976); inks, paint removers (*Dreisbach 1977); herbicides, fungicides, explosives, photographic chemicals (*Hawley 1977); isocyanates (*SRI); and rigid polyurethanes (*NIOSH/OSHA 1981). It is a chemical intermediate for dyes and pigments and a number of other materials (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

ANILINE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	EXCELLENT/MANY
Butyl/Neoprene	GOOD/LIMITED
CPE	GOOD/LIMITED*
Neoprene	POOR/MANY
Nitrile	POOR/LIMITED
PE	POOR/MANY
PVC	POOR/MANY
Saranex	GOOD/LIMITED
Teflon	GOOD/LIMITED
Viton	POOR/MANY
Viton/Neoprene	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ANILINE

(62-53-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless, oily liquid, or solid below -6 degrees C (21 degrees F).

Odor - Aromatic, aminelike.

Commercial Form - Brown, oily liquid.

Uses - Manufacture of resins, rigid polyurethane, varnish, perfume, ink, paint remover, shoe blacks, artificial sweeteners, pesticides, pharmaceuticals, photographic chemicals, and optical whitening agents; solvent; analytical reagent.

Other Names - Aminobenzene, Aminophen, Anyvim, Benzidam, Cyanol, Krystallin, Kyanol, phenylamine.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, diazepam, phenytoin, dopamine, levarterenol, methylene blue.

Signs and Symptoms of Acute Aniline Exposure:

Signs and symptoms of acute exposure to aniline may be severe and include dyspnea (shortness of breath), respiratory paralysis, cardiac arrhythmias, and cardiovascular collapse. Victims may experience headache, irritability, disorientation, lethargy, weakness, incoordination, dizziness, and drowsiness. Delerium, shock, convulsions, and coma may also be observed.

Gastrointestinal effects include dryness of throat, nausea, and vomiting. Painful urination, oliguria (scanty urination), and hematuria (bloody urine) may occur. Aniline may irritate the skin, eyes, and mucous membranes; cyanosis (blue tint to skin and mucous membranes) is a common finding.

ANILINE

Emergency Life-Support Procedures:

Note: Victims at special risk include individuals with glucose-6-phosphate-dehydrogenase deficiency, those with liver and kidney disorders, blood diseases, or a history of alcoholism.

Acute exposure to aniline may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to aniline.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to aniline.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

ANILINE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of aniline is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of aniline may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DICHLORVOS

CAS Registry Number: 62-73-7

Synonyms: O,O-Dimethyl O-2,2-Dichlorovinyl Phosphate; 2,2-Dichloroethenyl Phosphoric Acid Dimethyl Ester; 2,2-Dichlorovinyl Dimethyl Phosphate; Atgard; Bay-19149; Bibesol; Brevinyl; Brevinyl E50; Canogard; Cekusan; Chlorvinphos; Cyanophos; DDVF; DDVP; DEDEVAP; Deriban; Derribante; Dichlorman; Dichlorovas; Dichlorovos; Dichlorphos; Dimethyl 2,2-Dichloroethenyl Phosphate; Dimethyl 2,2-Dichlorovinyl Phosphate; Divipan; ENT 20738; Equigard; Equigel; Estrosel; Ethenol, 2,2-Dichloro-, Dimethyl Phosphate; Fecama; Herkal; Herkol; Krecalvin; Mafu; Marvex; NCI-C00113; Nerkol; No-Pest Strip; Nogos; Nuva; O,O-Dimethyl Dichlorovinyl Phosphate; OMS 14; Phosphoric Acid, 2,2-Dichlorovinyl Dimethyl Ester; Phosphoric Acid, 2,2-Dichloroethenyl Dimethyl Ester; Phosvit; Szklarniak; Task; Vapona; Vaponite; 2,2-Dichloroethenyl phosphate; Atgard V; Brevinyl Weedat 0002; Celcusan; Dichlorophos; Dimethyl dichlorovinyl phosphate; Nuvan 100 EC; Unifos; Vapona insecticide; Astrobot; Estrosol; Nuvan; SD1750; Fly fighter; Fly-die; Mopari UN NA 2783; Nogos 50; Nogos G; NSC-6738; OKO; Tap 9vp; Task Tabs; Tenac; UDVF; Unifos 50 EC; Vapona II; Verdican; Verdipor; Vinyl alcohol, 2,2-Dichloro-, Dimethyl Phosphate; Vinylophos

Chemical Formula: $C_4H_7Cl_2O_4P$

Molecular Weight: 220.98

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.013 mg/liter/4 hours (*NIOSH/RTECS 1985).

TPQ: 1,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 284°F, 140°C at 20 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.415 at 25°C/4°C (*Merck 1976)

DICHLORVOS

SECTION I (continued)

Vapor Pressure (mmHg): 0.01 at 30°C (*Sunshine 1969)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Approximately 1 g/100 ml (*Merck 1976)

Appearance and Odor: Oily colorless to amber liquid with an aromatic chemical odor (*Patty 1963; *NIOSH/OSHA 1981)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 mg/m^3 (skin) (NIOSH/OSHA 1978, p. 84)

ACGIH TLV: TWA 0.1 ppm, 1 mg/m^3; STEL 0.3 ppm, 3 mg/m^3 (*AGGIH 1

IDLH: 200 mg/m^3 (NIOSH/OSHA 1978, p. 84)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): Dichlorvos is a very tox compound with a probable lethal oral dose in humans between 50 and 50 mg/kg, or between 1 teaspoonful and 1 oz. for a 70 kg (150 lb.) person. However, brief exposure (30-60 minutes) to vapor concentrations as high 6.9 mg/liter did not result in clinical signs or depressed serum cholinesterase levels. Toxic changes are typical of organophosphate insecticide poisoning with progression to respiratory distress, respirator paralysis, and death if there is no clinical intervention (Gosselin 1984, pp. II-291 and III-336, 337).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Greater than 175°F (no method given) (*N 1978)
Flammable Limits: Moderately flammable (NIOSH/OSHA 1978, p. 84) ignite easily (*DOT 1984)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Water in flooding quantities as fog, alcohol dry chemical, or carbon dioxide (NIOSH/OSHA 1978, p. 84). Do not the material (*DOT 1984).

DICHLORVOS

SECTION IV (continued)

Special Fire Fighting Procedures: Use self-contained breathing apparatus with a full face piece operated on pressure-demand or other positive pressure mode. Prevent skin contact with protective clothing (*NIOSH/OSHA 1978). Isolate area and deny entry. Fight fire from maximum distance. Dike fire control water for future disposal (*DOT 1984).

Unusual Fire and Explosion Hazards: Highly toxic chloride fumes or phosgene may be released when this product burns. Firefighters should take precautions noted above (*Sax 1979).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Encyc Occupat Health and Safety 1971)
Stable:

Conditions to Avoid: Hydrolyzes in water (*Sunshine 1969).

Incompatibility (Materials to Avoid): Corrosive to iron and mild steel (*Worthing 1979); acids or acid fumes (*Sax 1979).

Hazardous Decomposition or Byproducts: Toxic chloride fumes and phosgene formed if heated to decomposition or on contact with acid or acid fumes (*Sax 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Agricultural insecticide for use on crops, stored products, animals, and premises; insecticide for slow release on pest-strips for pest control in homes and aircraft; anthelmintic for dogs, swine, and horses; botacide for horses; flea collars for dogs (*Gosselin 1976; *Rossoff 1974; *Worthing 1979; *SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Prevent access to area from public by isolating area and denying entry. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leaks if you can do it without risk. Reduce vapors with water spray. Take up small spills with sand or other noncombustible absorbent material for later disposal in cannisters. Dike large spills far ahead of spill for later disposal (*DOT 1984).

DICHLORVOS

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Sweating, twitching, contracted pupils, respiratory distress (tightness in the chest and wheezing), salivation (drooling), lacrimation (tearing), nausea, vomiting, abdominal cramps, diarrhea, involuntary defecation and urination, slurred speech, coma, apnea (cessation of breathing), and death (Doull 1980, pp. 367-368).

Emergency and First Aid Procedures: Call emergency medical care. If victim was exposed by inhalation, move to fresh air. If not breathing, give artificial respiration; if breathing is difficult, give oxygen. If exposure was by contact, flush skin or eyes with running water for at least 15 minutes; it is critical to remove the material from the skin as quickly as possible. Also remove contaminated clothing and shoes. Victim should be kept quiet, warm, and observed for delayed effects (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM FLUOROACETATE

CAS Registry Number: 62-74-8

Synonyms: Acetic Acid, Fluoro-, Sodium Salt; 1080; Compd 1080; Compound No. 1080; Fluoroacetic Acid, Sodium Salt; Fratol; Furatol; Ratbane 1080; SMFA; Sodium Fluoacetate; Sodium Fluoacetic Acid; Sodium Fluoracetate; Sodium Monofluoroacetate; Ten-Eighty; TL 869; Yasoknock

Chemical Formula: $C_2H_2FO_2Na$

Molecular Weight: 100.02

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (guinea pig) 0.1 mg/liter/10 minutes (*NIOSH/RTECS 1985).

TPQ: 10/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.0 at 20°C (*ACGIH 1980)

Melting Point: 392°F, 200°C (*Weast 1979); decomposes at 392°F, 200°C (*Hawley 1981)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1110 g/liter at 25°C (*Weast 1979)

Appearance and Odor: White powder (*Weast 1979); odorless (*Hawley 1981).

SODIUM FLUOROACETATE

SECTION II (continued)

Usually marketed as water solution containing 0.5 percent Nigrosine as black warning color (*Spencer 1982).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.05 mg/m^3 (skin) (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.05 mg/m^3 (skin); STEL 0.15 mg/m^3 (skin) (*ACGIH 1983)

IDLH: 5 mg/m^3 (NIOSH/OSHA 1978, p. 166)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is super toxic. The probable oral lethal dose in humans is less than 5 mg/kg, or a taste (less than 7 drops) for a 150-lb. person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not combustible (NIOSH/OSHA 1978, p. 166)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Stay upwind; keep out of low areas. Wear self-contained, positive pressure breathing apparatus and full protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits highly toxic fumes of sodium oxide and fluorides (*Sax 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NIOSH/OSHA 1978)

Conditions to Avoid: Decomposing heat (*Sax 1984)

SODIUM FLUOROACETATE

SECTION V (continued)

Incompatibility (Materials to Avoid): None hazardous (NIOSH/OSHA 1978, p.166)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits fumes of sodium oxide and fluorides (*Sax 1984).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used for control of predatory animals, coyotes, and rodents (*Farm Chemicals Handbook 1984).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material. Stay upwind; keep out of low areas (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include nausea, vomiting, diarrhea, hyperactive behavior, convulsions, coma, and ventricular fibrillation. Symptoms are usually seen within one-half hour of exposure, but severe effects may be delayed as long as 20 hours (*Rumack 1975 to Present).

Emergency and First Aid Procedures: There is no known specific treatment for fluoroacetate exposure, but generally symptomatic support should be provided (*Rumack 1975 to Present). Move victim to fresh air. Call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NITROSODIMETHYLAMINE

CAS Registry Number: 62-75-9

Synonyms: N-Nitrosodimethylamine; Dimethyl Nitrosamine; Dimethylamine, N-Nitroso-; Dimethylnitrosamine; Dimethylnitrosoamine; DMN; DMNA; Methanamine, N-Methyl-N-Nitroso-; N,N-Dimethylnitrosamine; N-Methyl-N-Nitrosomethanamine; N-Nitroso-N,N-Dimethylamine; NDMA

Chemical Formula: $C_2H_6N_2O$

Molecular Weight: 74.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.173 mg/liter/4 hours (*NIOSH/RTECS 1985).

TPQ: 1,000 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 304-307°F, 151-153°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.0048 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble (*Merck 1983)

Appearance and Odor: Yellow oily liquid (*IARC 1972-1985); faint characteristic odor (*Clayton and Clayton 1982)

NITROSODIMETHYLAMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA and STEL: Industrial substance suspected of carcinogenic potential in humans (*ACGIH 1984)

IDLH: Not Found

Other Limits Recommended: Exposures should be avoided, in so far as possible, or otherwise be kept to an absolute minimum; suspected of carcinogenic potential in humans (*ACGIH 1984).

Routes of Entry: **Inhalation:** Yes (*Sunshine 1969)
Skin: Yes (*Sunshine 1969)
Ingestion: Yes (*Sunshine 1969)

Health Hazards (Acute, Delayed, and Chronic): Extremely high toxicity (*Sunshine 1969). It is a suspected human carcinogen. The lowest lethal oral dose in humans has been reported at 10 mg/kg/80 week intermittent exposure (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Clayton and Clayton 1981, p. 3119)

Conditions to Avoid: Exposure to ultraviolet light (Clayton and Clayton 1981, p. 3119).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, pp. 1180-1181).

NITROSODIMETHYLAMINE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Nitrosodimethylamine was formerly used in the production of rocket fuels. Presently used as an antioxidant, as an additive for lubricants and as a softener of copolymers (Merck 1983, p. 952). It is an intermediate for 1,1-dimethylhydrazine (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). Spills can be absorbed by celite or commercial spill absorbent. After absorbent containing major share of nitrosamine has been picked-up (avoid dusts; do not sweep), surface should be thoroughly cleaned with strong detergent solution. If major spill occurs outside of ventilated area, room should be evacuated and cleanup operation should be carried out by persons equipped with self-contained breathing apparatus (*NRC 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include nausea, vomiting and malaise (*Cooper 1980). Chronic exposure may cause liver disease with jaundice and swelling (*Hamilton 1984) with low platelet count (*Cooper 1980).

Emergency and First Aid Procedures: Establish respiration; prevent absorption; decontaminate with soap and water; for eye exposure, flush with water (*Rumack 1975 to Present). (Poisonous Liquid or Gas, n.o.s.) Move

NITROSODIMETHYLAMINE

SECTION IX (continued)

victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 15).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENOL, 3-(1-METHYLETHYL)-, METHYLCARBAMATE

CAS Registry Number: 64-00-6

Synonyms (NIOSH/RTECS, 1983, Volume I, p. 832): Carbamic Acid, Methyl-, m-Cumenyl Ester; Carbamic Acid, N-Methyl-, 3-Isopropylphenyl Ester; Compound 10854; m-Cumenol Methylcarbamate; m-Cumenyl Methylcarbamate; ENT 25,500; ENT 25,543; H 5727; H 8757; HER. 5727; Hercules 5727; Hercules AC 5727; HIP; m-Isopropylphenol N-Methylcarbamate; m-Isopropylphenyl Methylcarbamate; m-Isopropylphenyl N-Methylcarbamate; 3-Isopropylphenyl Methylcarbamate; N-Methyl m-Isopropylphenyl Carbamate; N-Methyl 3-Isopropylphenyl Carbamate; OMS 162; 1PC; Phenol, m-Isopropyl-, Methylcarbamate; UC 10854; Union Carbide 10854; Union Carbide UC-10,854

Chemical Formula: $C_{11}H_{15}NO_2$

Molecular Weight: 193.27

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 10 mg/kg (*NIOSH/RTECS 1985).

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 162-165°F, 72-74°C (Hayes 1982, p. 450)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

PHENOL, 3-(1-METHYLETHYL)-, METHYLCARBAMATE

SECTION II (continued)

Solubility in Water: 85 ppm at 30°C (Hayes 1982, p. 450)

Appearance and Odor: Pure white solid without appreciable odor (Hayes 1982, p. 450).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) (DOT 1984, Guide 55)
Skin: Yes (Sax 1984, p. 820)
Ingestion: Yes (Sax 1984, p. 820)

Health Hazards (Acute, Delayed, and Chronic): It is a cholinesterase inhibitor (Hayes 1982, p. 450).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fight fire from maximum distance (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammabillty Rating: Not Found

PHENOL, 3-(1-METHYLETHYL)-, METHYLCARBAMATE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Hayes 1982, p. 450)

Conditions to Avoid: Decomposing heat (Sax 1984, p. 820)

Incompatibility (Materials to Avoid): Incompatible with alkalis (Hayes 1982, p. 450).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 820).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an insecticide to protect cotton, fruit, vegetables and field crops (Farm Chemicals Handbook 1984, p. C-236). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Keep unnecessary people away and stay upwind. Do not touch the material or handle broken packages without protective clothing. Use water spray to reduce vapors. Take up spills with non-combustible absorbent material. For small dry spills, place material in a clean dry container with a clean shovel and cover; remove from site of spill. For large spills dike far ahead for later disposal (DOT 1984, Guide 55; Student 1981, p. 104).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Exposure may result in weakness, dizziness, tightness in the chest, headache, pinpoint pupils, profuse sweating, blurred vision, stomach pain, vomiting, skin rashes, and giddiness (Hayes 1982, p. 451).

PHENOL, 3-(1-METHYLETHYL)-, METHYLCARBAMATE

SECTION IX (continued)

Emergency and First Aid Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 55).

COMMENTS:

Sources searched but no information found:

Weiss 1980
Buchel 1983
Gosselin 1984
Merck 1983
Weast 1979

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- COLCHICINE

CAS Registry Number: 64-86-8

Synonyms: 7-alpha-H-Colchicine; Acetamide, N-(5,6,7,9-Tetrahydro-1,2,3,10-Tetramethoxy-9-oxobenzo[a]heptalen-7-yl); Benzo[a]heptalen-9(5H)-one, 7-acetamido-6,7-dihydro-1,2,3,10-tetramethoxy-; Colchicenos; Colchisol; Colcin; Colsaloid; Condylon; N-Acetyl Trimethylcolchicinic acid, Methyl Ether; NSC 757

Chemical Formula: $C_{22}H_{25}NO_6$

Molecular Weight: 399.43

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{lo} oral (dog, cat) 0.125 mg/kg (*NIOSH/RTECS 1985).

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 288-302°F, 142-150°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g dissolves in 22 ml (*Merck 1976)

Appearance and Odor: Odorless or nearly so (*Hawley 1977); pale yellow needles or powder; darkens on exposure to light (*Merck 1976).

COLCHICINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. Probable oral lethal dose in humans is less than 5 mg/kg, i.e. less than 7 drops for a 70 kg (150 lb.) person (*Gosselin 1976). Death results from respiratory arrest. The fatal dose varies considerably; as little as 7 mg of colchicine has proved fatal (*Goodman 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Slight fire potential (*Sax 1979). Material is a drug (*SRI), with the following procedures for fires. Extinguish fire using agent suitable for type of surrounding fire. Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide or dry chemical (Student 1981, p. 215).

Special Fire Fighting Procedures: For drugs, solid, n.o.s., avoid breathing dusts and fumes from burning material. Keep upwind. Wear boots, protective gloves, and goggles (Student 1981, p. 215).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Clarke 1975)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

COLCHICINE

SECTION V (continued)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Colchicine is a drug used to treat gouty arthritis, pseudogout, sarcoidal arthritis and calcific tendinitis (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Precautions for drugs, solid, n.o.s., include the following. Avoid breathing dusts, and fumes from burning materials. Keep upwind. Avoid bodily contact with the material. Wear full protective clothing. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 215).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Burning of throat and skin are prominent symptoms. Nausea, vomiting, diarrhea and abdominal pain may occur several hours after exposure. Shock occurs because of extensive vascular damage. Kidney damage resulting in bloody urine and diminished urine output may occur (*Goodman 1975).

Emergency and First Aid Procedures: This material is an alkaloid (Merck 1983, p. 352); first aid for alkaloid exposure is as follows: move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NICOTINE SULFATE

CAS Registry Number: 65-30-5

Synonyms: (S)-3-(1-Methyl-2-Pyrrolidinyl)Pyridine Sulfate (2:1); L-1-Methyl-2-(3-Pyridyl)-Pyrrolidine Sulfate; L-3-(1-Methyl-2-Pyrrolidyl)Pyridine Sulfate; Black Leaf 40; Nicotine Sulfate, Solid; Nicotine, Sulfate (2:1); Pyridine, 3-(1-Methyl-2-Pyrrolidinyl)-, (S)-, Sulfate (2:1); Pyrrolidine, 1-Methyl-2-(3-Pyridyl)-, Sulfate

Chemical Formula: $(C_{10}H_{14}N_2)2.H_2SO_4$

Molecular Weight: 422.56

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mice) 8.55 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.15 at 20°C (solid) (*CHRIS 1978)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in water (*Merck 1976)

NICOTINE SULFATE

SECTION II (continued)

Appearance and Odor: A six-sided tablet (*Merck 1976) or white crystals; (40% solution = Black Leaf Forty) (Hawley 1981, p. 727).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.5 mg (nicotine)/m^3; STEL 1.5 mg (nicotine)/m^3 (skin) (*ACGIH 1982)

IDLH: Not Found

Other Limits Recommended: TWA for nicotine: 0.5 mg/m^3 (skin) (OSHA 1984, p. 663).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. Probable oral lethal dose in humans is less than 5 mg/kg (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976). Death is possible from respiratory failure caused by paralysis of the respiratory muscles (*Goodman 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: As for nicotine, extinguish with alcohol foam, dry chemical, or carbon dioxide (Sax 1984, p. 1997). Large fires can be extinguished with water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special protective clothing. Dike fire control water; do not scatter the material (*DOT 1984).

Unusual Fire and Explosion Hazards: As for nicotine, moderate explosion hazard when exposed to heat or flame (*Sax 1975).

NFPA Flammability Rating: Not Found

NICOTINE SULFATE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Menzie 1969)

Conditions to Avoid: Decomposing heat (Sax 1984, p. 1998)

Incompatibility (Materials to Avoid): (Non-Specific -- Nicotine) Avoid oxidizing materials (Sax 1984, p. 1997).

Hazardous Decomposition or Byproducts: When heated to decomposition, emits highly toxic fumes of sulfur oxides and organic fumes (Sax 1984, p. 1998).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an insecticide (*Merck 1976) and in veterinary medicine as an anthelmintic and external parasiticide (*Garner 1967).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

To clean up, do not touch spilled material; stop leak if possible. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for disposal. Small dry spill: with clean shovel place material into clean, dry container and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Onset of acute poisoning is rapid. Symptoms include nausea, salivation, abdominal pain, vomiting, diarrhea, cold sweat, headache, dizziness, disturbed hearing and vision, mental confusion, marked weakness, faintness and prostration, lowered blood pressure, difficult breathing, and weak, rapid and irregular pulse (*Goodman 1980). Inhalation irritates nose and throat. The liquid form irritates the eyes and (on prolonged contact) skin (*CHRIS 1978).

NICOTINE SULFATE

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air; 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 under observation (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CYCLOHEXIMIDE

CAS Registry Number: 66-81-9

Synonyms: Glutarimide, 3-(2-(3,5-Dimethyl-2-Oxocyclohexyl)-2- Hydroxyethyl)-; 2,6-Piperidinedione, 4-(2-(3,5-Dimethyl-2-Oxocyclohexyl)- 2-Hydroxyethyl)-(1S-(1 alpha(S*), 3 alpha, 5 beta))-; Acti-aid; Acti-Dione-PM (-RZ, -BR, & -S); Actidion; Actidione; Actidione PM; Actispray; beta-(2-(3,5-Dimethyl-2-Oxocyclohexyl)-2-Hydroxyethyl)Glutarimide; Hizarocin; Kaken; Naramycin; Naramycin A; Neocycloheximide; NSC-185; TZA; U 4527

Chemical Formula: $C_{15}H_{23}NO_4$

Molecular Weight: 281.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 2 mg/kg (*NIOSH/RTECS 1985).

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 247-250°F, 119.5-121°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Moderately soluble (Sax 1984, p. 833); 21 g/liter at 36°F, 2°C (*Merck 1976)

CYCLOHEXIMIDE

SECTION II (continued)

Appearance and Odor: Colorless crystals (*Spencer 1973).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose in humans is 5-50 mg/kg, or 7 drops to 1 teaspoonful for a 150-lb. person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Fungicides, Poison B Solid) Use agent suitable for surrounding fire. Use alcohol foam, carbon dioxide, or dry chemical. Use water in flooding quantities as fog (Student 1981, p. 259).

Special Fire Fighting Procedures: (Non-Specific -- Fungicides, Poison B Solid) Avoid breathing dusts and fumes from burning material. Keep upwind. Wear self-contained breathing apparatus. Avoid bodily contact with the material. Wear full protective clothing (Student 1981, p. 259).

Unusual Fire and Explosion Hazards: When exposed to heat, it emits toxic fumes, including nitrogen oxides (Sax 1984, p. 833).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Merck 1976)

CYCLOHEXIMIDE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When exposed to heat, it emits toxic fumes, including nitrogen oxides (Sax 1984, p. 833).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a fungicide (*Merck 1976), and as a medication in cancer therapy (*Rumack 1975 to Present).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Fungicides, Poison B Solid) Avoid breathing dusts. Keep upwind. Avoid bodily contact with the material (Student 1981, p. 259). Material is rapidly inactivated at room temperature by dilute alkali (*Merck 1976).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CYCLOHEXIMIDE

(66-81-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless crystals.

Commercial Forms - Oil solution, wettable powder, water-soluble tablets.

Uses - Chemotherapy, turf disease control, plant growth regulation, fungicide.

Other Names - Acti-aid, Actidione, Actispray, glutarimide, 3-(2-(3,5-dimethyl-2-oxocyclohexyl)-2-hydroxyethyl)-; Hizarocin, Kaken, Naramycin A.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, hydrocortisone, atropine.

Signs and Symptoms of Acute Cycloheximide Exposure:

Warning: *Effects may be delayed for 6 to 24 hours. Caution is advised.*

Signs and symptoms of acute exposure to cycloheximide may include increased salivation, nausea, vomiting, diarrhea, and dark, bloodstained stools. Dermal effects may range from erythema (redness) to sloughing. Central nervous system excitement, including tremor, may be noted. Liver and kidney damage, coma, and cardiovascular collapse are also possible.

CYCLOHEXIMIDE

Emergency Life-Support Procedures:

Acute exposure to cycloheximide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to cycloheximide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to cycloheximide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

CYCLOHEXIMIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of cycloheximide is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of cycloheximide may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROFORM

CAS Registry Number: 67-66-3

Synonyms: Formyl Trichloride; Freon 20; Methane, Trichloro-; Methane Trichloride; Methenyl Chloride; Methenyl Trichloride; Methyl Trichloride; NCI-CO2686; R-20; R 20 (Refrigerant); TCM; Trichloroform; Trichloromethane

Chemical Formula: $CHCl_3$

Molecular Weight: 119.39

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 10,000 (pounds)

RQ: 5000 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 143°F, 61.7°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.4832 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): 100 at 10.4°C (*Sax 1979)

Melting Point: -82.3°F, -63.5°C (*Weast 1979)

Vapor Density (AIR=1): 4.12 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): (Carbon Tetrachloride = 1) 1.18 (*General Electric Co. 1979, MSDS #315)

Solubility in Water: 1 mL/200 mL at 25°C (*Merck 1976)

CHLOROFORM

SECTION II (continued)

Appearance and Odor: A clear, colorless and mobile liquid with a characteristic odor (*IARC 1972-1985).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 50 ppm (240 mg/m^3) (NIOSH 1987, p. 80)

ACGIH TLV: TWA 10 ppm (50 mg/m^3) (ACGIH 1986-87, p. 13)

IDLH: 1,000 ppm (NIOSH/OSHA 1978, p. 68)

Other Limits Recommended: NIOSH: 2 ppm 60-minute ceiling; potential occupational carcinogen (NIOSH 1897, p. 80 and Appendix A). Industrial substance suspect of carcinogenic potential for humans (ACGIH 1985, p. 42). EEGL 100.0 ppm (60 minutes) (NRC 1984a, pp. 57-76).

Routes of Entry: **Inhalation:** Yes (*NIOSH 1974)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*ITI 1982)

Health Hazards (Acute, Delayed, and Chronic): It is classified as moderately toxic. Probable oral lethal dose for humans is 0.5 to 5 g/kg (between 1 ounce and 1 pint) for a 150 lb. person. The mean lethal dose is probably near 1 fluid ounce (44 g) (*Gosselin 1976). It is a human suspected carcinogen (*IARC 1972-1985). Also, it is a central nervous system depressant and a gastrointestinal irritant (*Challen PS et al. 1958. Br J Ind Med 15:243). It has caused rapid death attributable to cardiac arrest and delayed death from liver and kidney damage (*IARC 1972-1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): None (*General Electric Co. 1979, MSDS #315)
Flammable Limits:
LEL: None (*General Electric Co. 1979, MSDS #315)
UEL: None (*General Electric Co. 1979, MSDS #315)

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog or foam (*DOT 1984).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and special protective clothing. Move container from fire area. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (*DOT 1984).

Unusual Fire and Explosion Hazards: Container may explode in the heat of fire (*DOT 1984). When heated it liberates phosgene (*ITI 1982); hydrogen chloride, chlorine and toxic and corrosive oxides of carbon and chlorine (*General Electric Co. 1979, MSDS #315).

CHLOROFORM

SECTION IV (continued)

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*CHRIS 1978)

Conditions to Avoid: It develops acidity from prolonged exposure to air and light (*General Electric Co. 1979, MSDS #315).

Incompatibility (Materials to Avoid): Chloroform explodes when in contact with aluminum powder or magnesium powder or with alkali metals (e.g., lithium, sodium, and potassium) (*NFPA 1978) and dinitrogen tetroxide. It reacts vigorously with acetone in the presence of potassium hydroxide or calcium hydroxide (*Bretherick 1975). It is oxidized by strong oxidizers such as chromic acid forming phosgene and chlorine (*IARC 1972-1985). It reacts vigorously with triisopropylphosphine (*Bretherick 1975).

Hazardous Decomposition or Byproducts: When heated, it emits hydrogen chloride, chlorine, toxic and corrosive oxides of carbon and chlorine (*General Electric Co. 1979, MSDS #315) and phosgene (*ITI 1982).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a grain fumigant; solvent for pesticides, adhesives (*IARC 1972-1985) fats, oils, rubbers, alkaloids, waxes (*Merck 1976); chemical intermediate for dyes and pesticides; and a component of cough syrups, toothpastes, and linaments (*SRI). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent materal and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

CHLOROFORM

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Butyl/Neoprene	POOR/LIMITED*
CPE	POOR/MANY
Neoprene	POOR/MANY
Nitrile	POOR/MANY
PE	POOR/MANY
PVC	POOR/MANY
Saranex	POOR/MANY
Teflon	GOOD/LIMITED
Viton	GOOD/LIMITED
Viton/Chlorobutyl	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms of acute exposure include fainting sensation, vomiting, dizziness, salivation, nausea, fatigue, and headache (*ACGIH 1971-1979). Other symptoms are respiratory depression, coma, kidney damage, and liver damage (*IARC 1972-1985). Liquid in the eye causes tearing and conjunctivitis (*Grant 1974). Symptoms of chronic exposure include loss of appetite, hallucinations, moodiness and physical and mental sluggishness (*NIOSH 1974. Criteria for a recommended standard occupational exposure to chloroform. DHEW Pub NIOSH 75-114).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (*DOT 1984).

EPA CHEMICAL PROFILE

Date: June 22, 1987
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPIOPHENONE, 4'-AMINO-

CAS Registry Number: 70-69-9

Synonyms: 1-(4-Aminophenyl)-1-Propanone; p-Aminopropiophenone; PAPP; Paraminopropiophenone; USAF UCTL-1856

Chemical Formula: $C_9H_{11}NO$

Molecular Weight: 149.21

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 5.6 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 284°F, 140°C (Merck 1983, p. 70)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Merck 1983, p. 70)

Appearance and Odor: Yellow needles (Merck 1983, p. 70)

PROPIOPHENONE, 4'-AMINO-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 245)

Health Hazards (Acute, Delayed, and Chronic): Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found

Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PROPIOPHENONE, 4'-AMINO-

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Ingestion of large doses can cause cyanosis (Sax 1984, p. 245)

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Farm Chemicals Handbook 1984
Hayes 1982
Worthing 1979
Verschueren 1983
Clayton and Clayton 1981-1982
Weiss 1980
Goodman and Gilman 1985
Gosselin 1984
Hawley 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIGITOXIN

CAS Registry Number: 71-63-6

Synonyms: Acedoxin; Card-20(22)-Enolide, 3-((O-2,6-Dideoxy-beta-D-Ribo-Hexopyranosyl-(Hexopyranosyl-(1-4)-2,6-Dideoxy-beta-D-Ribo-Hexopyranosyl)oxy) -14-Hydroxy-, (3beta, 5beta)-; Cardigin; Carditoxin; Cristapurat; Crystalline Digitalin; Crystodigin; Digilong; Digimed; Digimerck; Digisidin; Digitalin; Digitaline Cristallisee; Digitaline Nativelle; Digitoksim; Digitophyllin; Digitoxigenin Tridigitoxoside; Ditaven; Glucodigin; Lanatoxin; Myodigin; Purodigin; Purpurid; Unidigin

Chemical Formula: $C_{41}H_{64}O_{13}$

Molecular Weight: 764.92

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 0.18 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 493-495°F, 256-257°C (when anhydrous) (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g in 100 liters at 20°C (*Merck 1976)

DIGITOXIN

SECTION II (continued)

Appearance and Odor: White or pale buff microcrystalline powder (*Osol 1975); odorless (Merck 1983, p. 353)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Material is bioactive and capable of causing cardiac arrythmias and electrolyte imbalances that may be fatal. Death is due to ventricular fibrillation or cardiac standstill (*Gosselin 1976). Material has a high toxicity hazard rating; it may cause death or permanent injury after a very short exposure (*Sax 1979). It is classified as super toxic; an estimated single lethal dose is 3-10 mg (Gosselin 1984, p. II-252).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Drugs or Medicines, Solid, n.o.s.) Extinguish fire using agent suitable for type of surrounding fire (material itself burns with difficulty.) Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide or dry chemical (Student 1981, p. 215).

Special Fire Fighting Procedures: (Non-Specific -- Drugs or Medicines, Solid, n.o.s.) Avoid breathing dusts and fumes from burning material. Keep upwind. Wear boots, protective gloves, and goggles (Student 1981, p. 216).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits acrid smoke and irritating fumes (Sax 1984, p. 1035).

NFPA Flammability Rating: Not Found

DIGITOXIN

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Material is a cardiotonic drug (*Goodman 1975).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE

(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Drugs or Medicines, Solids, n.o.s.) Keep upwind. Avoid bodily contact with the material. Wear full protective clothing. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 216).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Nausea and vomiting, headache, malaise, fatigue, weakness, drowsiness, abdominal discomfort are symptomatic of toxicity. Visual disturbances (reduction in visual acuity, illusions of flickering or shimmering lights, abnormal color vision) and emotional disorders (including confusion, disorientation, aphasia, delirium, hallucinations, and rarely convulsions) are also possible toxic effects (*Gosselin 1976; *Grant 1974).

Emergency and First Aid Procedures: (Non-Specific -- Medicines, n.o.s.) Move victim to fresh air; 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

DIGITOXIN

SECTION IX (continued)

and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 11).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ENDRIN

CAS Registry Number: 72-20-8

Synonyms: 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-6,7-Epoxy-1,4,4a,5,6,7,8,8a-Octahydro-,endo,endo-; Compound 269; Endrex; Endricol; ENT 17,251; Experimental Insecticide 269; Hexachloroepoxyoctahydro-endo,endo-Dimethanonaphthalene; Hexadrin; Mendrin; NCI-C00157; SD 3419; Oktanex; EN 57; 2,7:3,6-Dimethanonaphth[2,3-b]Oxirene, 3,4,5,6,9,9-Hexachloro-1a,2,2a, 3,6,6a,7,7a-Octahydro-, (1a.alpha., 2.beta., 2a.beta., 3.alpha., 6.alpha., 6a.beta., 7.beta., 7a.alpha.)-; Nendrin; 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4:5,8-dimethanonaphthalene; 1,2,3,4, 10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-1,4-endo-5,8-dimethanonaphthalene; 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4:5,8-endo,endo-dimethanonaphthalene; NCI 01565; C00157; Isodrin Epoxide; Endrical

Chemical Formula: $C_{12}H_8Cl_6O$

Molecular Weight: 380.90

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 1.37 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.7 at 68°F, 20°C (*USEPA 1980)

Vapor Pressure (mmHg): 0.0000002 at 77°F, 25°C (*Worthing 1979)

Melting Point: Decomposes at 473°F, 245°C (Merck 1983, p. 517)

Vapor Density (AIR=1): Not Found

ENDRIN

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (*IARC 1972-1985)

Appearance and Odor: White, crystalline solid; light tan color for technical grade (*NFPA 1978). Odorless (*CHRIS 1978) or mild chemical odor for technical grade (*IARC 1972-1985).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 mg/m^3 (skin) (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.1 mg/m^3 (skin) (ACGIH 1986-87, p.18)

IDLH: 200 mg/m^3 (*NIH EPA, OHM/TADS 1984)

Other Limits Recommended: STEL 0.5 mg/m^3 for 30 minutes (Weiss 1980, p. 402)

Routes of Entry: **Inhalation:** Yes (*USEPA 1980)
Skin: Yes (*NFPA 1978)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic (*Gosselin 1976). It is rapidly absorbed through the skin (*NFPA 1978). Symptoms appear between 20 minutes and 12 hours after exposure (*Gosselin 1976). There is evidence that this material may cause chromosomal damage (*USEPA 1980). Doses of 1 mg/kg can cause symptoms (Sax 1984, p. 1278). It is a suspected carcinogen (Hawley 1981, p. 410). Also, it is a central nervous system depressant and hepatotoxin (Farm Chemicals Handbook 1984, p. C-93).

Medical Conditions Generally Aggravated by Exposure: Pregnant women are considered to be at special risk (*USEPA 1980).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Commercial product may contain flammable liquid with flashpoint 80°F, 27°C (*NIH EPA, OHM/TADS 1984)
Flammable Limits:
LEL: 1.1% (commercial product) (Weiss 1980, p. 402)
UEL: 7.0% (commercial product) (Weiss 1980, p. 402)

Extinguishing Methods: Use dry chemical, foam, carbon dioxide (*CHRIS 1978), water spray for solution (*NFPA 1978). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Use water to keep fire-exposed containers cool (*NFPA 1978). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed

ENDRIN

SECTION IV (continued)

spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Toxic hydrogen chloride and phosgene may be generated when solution burns (*CHRIS 1978).

NFPA Flammability Rating: 1 (solution); 0 (dry)

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*USEPA 1980)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Strong oxidizers, strong acids (*NIH EPA, OHM/TADS 1984), and parathion (Sax 1984, p. 1279)

Hazardous Decomposition or Byproducts: Toxic hydrogen chloride and phosgene may be generated when solutions burn (*CHRIS 1978).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not found

SECTION VI -- USE INFORMATION

This material is used primarily as an insecticide for field crops (*Worthing 1979). Only cotton and bird perch uses registered in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

For leaks or spills, use water spray to disperse vapor and to flush spills (*NFPA 1978). Liquid containing this material should be absorbed in vermiculite, dry sand, earth (*NIOSH/OSHA 1981). Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

ENDRIN

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: It can cause death by respiratory arrest. Symptoms include headache, nausea, vomiting, dizziness, tremors, convulsions, loss of consciousness, rise in blood pressure, fever, frothing of the mouth, deafness, coma, and death (*Gosselin 1976, Gosselin 1984, pp. II-285, III-143).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL BROMIDE

CAS Registry Number: 74-83-9

Synonyms: Brom-o-gas; Bromomethane; Curafume; Dowfume MC-2 Soil Fumigant; Dowfume MC-33; Edco; Embafume; Halon 1001; Haltox; Iscobrome; Kayafume; MB; MBX; MEBR; Metafume; Methane, Bromo-; Methogas; Monobromomethane; Pestmaster; Profume; R 40B1; Rotox; Terabol; Terr-o-gas 100; Zytox

Chemical Formula: CH_3Br

Molecular Weight: 94.95

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 38.4°F, 3.56°C (*Weast 1979)

Specific Gravity (H_2O=1): Liquid: 1.730 at 0°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 1420 at 20°C (*Merck 1976)

Melting Point: -136°F, -93.6°C (*Merck 1976)

Vapor Density (AIR=1): 3.27 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1.34 g/100 g at 25°C (*Worthing 1979)

METHYL BROMIDE

SECTION II (continued)

Appearance and Odor: Colorless gas; usually odorless, but has a sweetish chloroform-like odor at high concentrations (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling Concentration 80 mg/m^3 (20 ppm) (NIOSH 1987,p. 158)

ACGIH TLV: TWA 20 mg/m^3 (5 ppm) (ACGIH 1986-87, p.23)

IDLH: 2,000 ppm (NIOSH/OSHA 1978, p. 126)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Gosselin 1976)
Skin: Yes (*Gosselin 1976)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Methyl bromide is a dangerous cumulative poison with delayed symptoms of central nervous system intoxication that may appear as long as several months after exposure (*White-Stevens 1971). High concentrations can produce fatal pulmonary edema. Chronic exposure can cause central nervous system depression and kidney injury (*Merck 1976). It may cause severe and permanent brain damage. Severe neurological signs may appear when there is a sudden exposure to high concentrations following continuous slight exposure (*Encyc Occupat Health and Safety 1971). Methyl bromide has practically no odor or irritating effects and therefore no warning, even at hazardous concentrations (*Clayton and Clayton 1981-82).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): None (*Sax 1979)
Flammable Limits:
LEL: 10% (*Sax 1979)
UEL: 16% (*Sax 1979)

Extinguishing Methods: Non-flammable in air; burns in oxygen (*Merck 1976). Use water spray, foam, carbon dioxide, or dry chemical (*NFPA 1978).

Special Fire Fighting Procedures: Full protective clothing, including self-contained breathing apparatus, coat, pants, gloves, boots, and bands around legs, arms, and waist should be provided. No skin surface should be exposed (*NFPA 1978). Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of bromides (*Sax 1979).

METHYL BROMIDE

SECTION IV (continued)

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of bromides (*Sax 1979).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 603)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide, rodenticide, fumigant, and nematocide; as a chemical intermediate (*SRI); and as a fire extinguishing agent (*Clayton and Clayton 1981-82).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Remove all ignition sources. Ventilate area of spill or leak, stop flow of gas or remove leaking cylinder to open air and repair leak or allow cylinder to empty. If material is in the liquid form, allow it to vaporize (*NIOSH/OSHA 1981). Stay upwind, keep out of low areas. Use water spray to reduce vapors (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Neoprene	GOOD/LIMITED*

METHYL BROMIDE

SECTION VIII (continued)

Nitrile	GOOD/LIMITED*
PE	POOR/LIMITED
PVC	POOR/LIMITED*
Saranex	GOOD/LIMITED
Viton	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for METHYL BROMIDE

(74-83-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless, transparent, easily liquefied gas, or volatile liquid.

Odor - Usually odorless, chloroformlike odor at higher concentrations.

Commercial Forms - 98% pure liquid or gas in steel cylinders.

Uses - Organic synthesis, fumigation, fire extinguishing, oil extraction from organic matter, pesticides, ionization chambers.

Materials to Avoid - Metals, oxidizers.

Other Names - Bromomethane, Curafume, Dowfume, Embafume, Haltox, Iscobrome, Kayafume, Metafume, Methogas, Monobromomethane, Pestmaste, Profume, Rotox, Terabol, Zytox.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate, dimercaprol, diazepam, phenytoin, phenobarbital, aminophylline, furosemide.

METHYL BROMIDE

Signs and Symptoms of Acute Methyl Bromide Exposure:

Warning: *Effects may be delayed for hours to days. Caution is advised.*

Signs and symptoms of acute exposure to methyl bromide may be severe and include tremors, convulsions, brain hemorrhage, paralysis, coma, and permanent brain damage. Respiratory effects include cough, tachypnea (rapid respiratory rate), pulmonary edema, and respiratory collapse. Cyanosis (blue tint to the skin and mucous membranes), pallor, ventricular fibrillation, and circulatory collapse may also occur. Lethargy, profound weakness, headache, dizziness, mental confusion, slurring of speech, staggering gait, and blurred or double vision are often found.

Gastrointestinal signs and symptoms include nausea, vomiting, abdominal pain, and anorexia. Oliguria (scanty urination), anuria (lack of urine formation), kidney hemorrhage, and kidney failure may occur. Contact with methyl bromide may cause dermatitis (red, inflamed skin) and conjunctivitis (red, inflamed eyes).

Emergency Life-Support Procedures:

Acute exposure to methyl bromide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methyl bromide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

METHYL BROMIDE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methyl bromide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDROCYANIC ACID

CAS Registry Number: 74-90-8

Synonyms: Hydrogen Cyanide; Prussic Acid; Aero Liquid HCN; Cyclon; Cyclone B; Evercyn; Formic Anammonide; Formonitrile; Zaclondiscoids

Chemical Formula: HCN

Molecular Weight: 27.03

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.357 mg/liter/5 minutes (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 78.1°F, 25.6°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.699 (liquid) (*Weast 1983)

Vapor Pressure (mmHg): 630 (*White-Stevens 1971)

Melting Point: 7.9°F, -13.4°C (*Merck 1983)

Vapor Density (AIR=1): 0.901 g/l (*Weast 1983)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible with water (*Merck 1976)

Appearance and Odor: Colorless gas or liquid; bitter almond odor (*Merck 1976; *CHRIS 1978)

HYDROCYANIC ACID

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 10 ppm (11 mg/m^3), as cyanide (NIOSH 1987 p. 138)

ACGIH TLV: Ceiling 10 mg/m^3 (10 ppm) (skin) (ACGIH 1986-87 p. 20)

IDLH: 50 ppm, as cyanide (NIOSH 1987, p. 138)

Other Limits Recommended: NIOSH: 5 mg/m^3 (4.7 ppm) (CN) 10 minute ceiling (NIOSH 1987, p. 138)

Routes of Entry: **Inhalation:** Yes (*Goodman 1975)
Skin: Yes (*Encyc Occupat Health and Safety 1983)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): It is super toxic. Breathing in a small amount of the gas or swallowing a very small amount may be fatal (*NFPA 1978; *Gosselin 1976). Average fatal dose is 50-60 mg. A few minutes of exposure to 300 ppm may result in death. Exposure to 150 ppm for 1/2 to 1 hour may endanger life (Merck 1983, p. 696).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 0°F, -18°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 5.6% (*NFPA 1978)
UEL: 40.0% (*NFPA 1978)

Extinguishing Methods: Use dry chemicals, alcohol foam, or carbon dioxide (*NFPA 1978). Small fires: let burn unless leak can be stopped immediately. Large fires: water spray, fog or foam. Move container from fire area if you can do it without risk. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Cool container with water using unmanned device until well after fire is out. Isolate area until gas has dispersed (*DOT 1984).

Special Fire Fighting Procedures: Firefighting should be done from a safe distance. A few whiffs of gas, or liquid penetrating firefighter's protective clothing, could be fatal. Only special protective clothing should be worn. Water spray should be used to keep containers cool (*NFPA 1978). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Evacuate area endangered by gas. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (*DOT 1984).

Unusual Fire and Explosion Hazards: Unstabilized hydrocyanic acid may polymerize spontaneously with explosive violence (*Hawley 1981). Flashback along vapor trail may occur (*CHRIS 1978). The explosion hazard is severe when this material is exposed to heat, flame, or oxidizers (*Sax 1975). It

HYDROCYANIC ACID

SECTION IV (continued)

forms explosive mixtures with air, and will react with water, steam, acid, or acid fumes to produce highly toxic fumes of cyanides. It may decompose explosively upon contact with alkaline material (Sax 1984, p. 1548).

NFPA Flammability Rating: 4

SECTION V -- REACTIVITY DATA

Stability: Unstable: Yes (*Hawley 1981)
Stable:

Conditions to Avoid: Hydrocyanic acid solution is sensitive to light (*Hawley 1977). It may become unstable and subject to explosion if stored for an extended time or exposed to high temperature and pressure (*CHRIS 1978). Avoid heat, flame or oxidizers (Sax 1984, p. 1548).

Incompatibility (Materials to Avoid): Acetylaldehyde, alkaline materials, oxidizers, water, steam, acid, and acid fumes (Sax 1984, p. 1548)

Hazardous Decomposition or Byproducts: Toxic cyanide fumes (Sax 1984, p. 1548)

Hazardous Polymerization: May Occur: Yes (*Hawley 1981)
May Not Occur:

Conditions to Avoid: Unstabilized hydrocyanic acid may polymerize spontaneously with explosive violence (*Hawley 1981). Can polymerize at 50-60°C or when catalyzed with traces of alkali (Sax 1984, p. 1548).

SECTION VI -- USE INFORMATION

Hydrogen cyanide is used as a rodent poison and as a fumigant (*Rossoff 1974). It is a chemical intermediate in the manufacture of acrylates, methacrylates, hexamethylenediamine, nitriles, and other materials (*Patty 1963). It is also used in metal polishes, electroplating solutions, and metallurgical and photographic processes (*Gosselin 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Stay upwind; keep out of low areas. Ventilate closed spaces before entering. Use water spray to reduce vapors. Do not touch spilled material; stop leak if you can do it without risk. Shut off ignition; no flares, smoking, or flames in hazard area. Isolate area until gas dispersed (*DOT 1984)

HYDROCYANIC ACID

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
Neoprene	GOOD/LIMITED*
PE	GOOD/LIMITED
PVC	POOR/LIMITED
Viton	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for HYDROCYANIC ACID (HYDROGEN CYANIDE)

(74-90-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Hydrocyanic acid toxicity can occur via ingestion, dermal/eye contact, or inhalation; death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility.*

Substance Characteristics:

Pure Forms - Colorless gas or water-white liquid below -13 degrees C (8 degrees F).

Odor - Bitter, almondlike.

Commercial Forms - 96 to 99% pure in 2, 5, and 10% solutions with a stabilizer in bottles, steel cylinders, and tank cars.

Uses - Rodenticide, fumigant, chemical intermediate, metallurgy and photography, constituent in metal polishes and electroplating solutions.

Other Names - Cyclon, formonitrile, hydrogen cyanide, prussic acid.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), sodium bicarbonate, diazepam, phenytoin.

HYDROCYANIC ACID (HYDROGEN CYANIDE)

Signs and Symptoms of Acute Hydrocyanic Acid Exposure:

Warning: *Hydrocyanic acid may be fatal if inhaled, swallowed, or absorbed through skin or mucous membranes. Caution is advised.*

Signs and symptoms of acute exposure to hydrocyanic acid may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cherry red mucous membranes and blood may be noted. Cardiac arrhythmias and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous membranes) may be observed.

Weakness, headache, vertigo (dizziness), agitation, giddiness, salivation, nausea, and vomiting, may be followed by combative behavior, convulsions, paralysis, protruding eyeballs, dilated and unreactive pupils, and coma. Tachypnea (rapid, shallow respirations) or hyperpnea (rapid, deep respirations) may be followed by respiratory depression. Lung hemorrhage and pulmonary edema may also occur.

Hydrocyanic acid is may be irritating to the skin, eyes, and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common.

Emergency Life-Support Procedures:

Acute exposure to hydrocyanic acid may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrocyanic acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with hydrocyanic acid-contaminated persons or their gastric contents can result in self-poisoning.*

HYDROCYANIC ACID (HYDROGEN CYANIDE)

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydrocyanic acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with hydrocyanic acid-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with hydrocyanic acid-contaminated persons or their gastric contents can result in self-poisoning.*

2. RUSH to a health care facility!

HYDROCYANIC ACID (HYDROGEN CYANIDE)

3. DO NOT induce vomiting or attempt to neutralize!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL MERCAPTAN

CAS Registry Number: 74-93-1

Synonyms: Mercaptomethane; Methanethiol; Methyl Sulfhydrate; Thiomethanol; Thiomethyl Alcohol

Chemical Formula: CH_4S

Molecular Weight: 48.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.0065 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 42.7°F, 5.95°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.8665 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 1 at -90.7°C; 10 at -67.5°C; 40 at -49.2°C; 100 at -34.8°C; 400 at -7.9°C; 760 at 6.8°C (*Weast 1979)

Melting Point: -189.4°F, -123°C (*Merck 1983)

Vapor Density (AIR=1): 1.66 (*Sax 1984)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 23.30 g/liter (*Merck 1983)

Appearance and Odor: Water-white liquid when below boiling point, or colorless gas (*Hawley 1981); odor of rotten cabbage (*Merck 1983)

METHYL MERCAPTAN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 20 mg/m^3 (10 ppm) 15 minute (NIOSH/OSHA 1978, p. 130)

ACGIH TLV: TWA 1 mg/m^3 (0.5 ppm) (*ACGIH 1983)

IDLH: 400 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 618)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Can cause death by respiratory paralysis (*ACGIH 1980). It is an eye and respiratory tract irritant. Exposure results in pulmonary edema and hepatic and renal damage (Clayton and Clayton 1981-82, p. 2067).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 0°F, -18°C (*Sunshine 1969)
Flammable Limits:
LEL: 3.9% (Weiss 1980, p. 618)
UEL: 21.8% (Weiss 1980, p. 618)

Extinguishing Methods: Small fires: let burn unless leak can be stopped immediately. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Cool container with water using unmanned device until well after fire is out. Isolate area until gas has dispersed (DOT 1984, Guide 13). Preferably let fire burn, stop gas flow. Fires may be extinguished with dry chemical, foam, or carbon dioxide (Weiss 1980, p. 618).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Evacuate area endangered by gas. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 13).

Unusual Fire and Explosion Hazards: Combustion produces irritating sulfur dioxide. Flash back along vapor track may occur (*CHRIS 1978). Very dangerous when exposed to heat, flame, or oxidizers. On decomposition it emits highly toxic fumes of sulfur oxides. It will react with water, steam or acids to produce toxic and flammable vapors; and can react vigorously with oxidizing materials (Sax 1984, p. 1764).

METHYL MERCAPTAN

SECTION IV (continued)

NFPA Flammability Rating: 4

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*CHRIS 1978)

Conditions to Avoid: Direct sunlight, and areas of high fire hazards (*Sax 1968)

Incompatibility (Materials to Avoid): Incompatible with mercuric oxide and oxidizing materials (Sax 1984, p. 1764).

Hazardous Decomposition or Byproducts: Irritating sulfur dioxide is produced upon combustion (Weiss 1980, p. 618). When heated to decomposition, it emits highly toxic fumes and flammable vapors (Sax 1984, p. 1764).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 618)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Manufacturing of pesticides (*Merck 1983); chemical intermediate for pharmaceuticals; dimethyl sulfide; fungicides; methionine; in jet fuels; in preparation of plastics (*SRI); and as a gas odorant to serve as a warning property for odorless but hazardous gases (*Clayton and Clayton 1981-82).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Shut off ignition sources; no flares, smoking, or flames in hazard area. Use water spray to reduce vapors. Isolate area until gas has dispersed (DOT 1984, Guide 13). Avoid breathing vapors (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

METHYL MERCAPTAN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide
for
METHYL MERCAPTAN

(74-93-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless gas, or water-white liquid below 6 degrees C (43 degrees F) or under pressure.

Odor - Similar to rotten cabbage.

Commercial Form - 98% pure liquefied gas in 180-lb cylinders or tank cars.

Uses - Manufacture of pesticides, fungicides, pharmaceuticals, methionine, dimethyl sulfide, plastics, jet fuels, gas odorant for odorless but hazardous gases.

Materials to Avoid - Mercuric oxide, oxidizers, bleaches.

Caution: *Highly flammable. Cylinders may explode when exposed to high temperatures or fire. Avoid sources of extreme heat or ignition including sparks or fire. Combustion produces irritating sulfur oxides.*

Other Names - Mercaptomethane, methanethiol, methyl sulfhydrate, thiomethanol, thiomethyl alcohol.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, dopamine, amyl nitrite, sodium nitrite, atropine.

METHYL MERCAPTAN

Signs and Symptoms of Acute Methyl Mercaptan Exposure:

Warning: *Effects may be delayed. Caution is advised.*

Signs and symptoms of acute exposure to methyl mercaptan may include fever, cough, shortness of breath, a feeling of tightness and burning in the chest, pulmonary edema, respiratory distress, respiratory paralysis, and respiratory failure/collapse.

Headache, loss of the sense of smell, dizziness, staggering gait, and heightened emotions may occur. Memory loss, damage to the central and peripheral nervous systems, tremor, convulsions, and coma may also occur. Gastrointestinal symptoms include difficulty swallowing, redness of the tongue and pharynx, nausea, vomiting, abdominal pain, and diarrhea. Urinary disturbances may also be found. Methyl mercaptan may irritate the eyes and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to methyl mercaptan may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methyl mercaptan.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methyl mercaptan.

METHYL MERCAPTAN

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of methyl mercaptan is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of methyl mercaptan may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

METHYL MERCAPTAN

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CARBON DISULFIDE

CAS Registry Number: 75-15-0

Synonyms: Carbon Bisulfide; Carbon Bisulphide; Carbon Disulphide; Carbon Sulfide; Dithiocarbonic Anhydride; NCI-C04591; Sulphocarbonic Anhydride; Sulphuret of Carbon; Weeviltox

Chemical Formula: CS_2

Molecular Weight: 76.13

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 116°F, 46.5°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.2632 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 360 at 25°C (*Sunshine 1969)

Melting Point: -167°F, -110.8°C (*Weast 1979)

Vapor Density (AIR=1): 2.67 (*Merck 1983)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.294% at 20°C (*Merck 1983)

CARBON DISULFIDE

SECTION II (continued)

Appearance and Odor: Mobile clear or faintly yellow liquid; reagent and commercial grades are foul smelling. Pure distillates have sweet, pleasing ethereal odor (*Merck 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 20 ppm; Ceiling Concentration 30 ppm; Peak Concentration 100 ppm/30 minutes/8 hours (*NIOSH 1985)

ACGIH TLV: 30 mg/m^3 (10ppm) (skin) (*ACGIH 1980)

IDLH: 500 ppm (NIOSH/OSHA 1978, p. 60)

Other Limits Recommended: NIOSH: 10 hour TWA 1 ppm; Ceiling Concentration 10 ppm/15 minutes (NIOSH 1987 p.72); EEGL 50.0 ppm (60 minutes) (NRC 1984a, pp. 41-56)

Routes of Entry: **Inhalation:** Yes (*NIOSH/RTECS 1985)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (*NIOSH/RTECS 1985)

Health Hazards (Acute, Delayed, and Chronic): The material affects the central nervous system, cardiovascular system, eyes, kidneys, liver, and skin. It may be absorbed through the skin as a vapor or liquid, inhaled or ingested. The probable oral lethal dose for a human is between 0.5 and 5 g/kg or between 1 ounce and 1 pint (or 1 pound) for a 70 kg (150 lb.) person (*Gosselin 1976). In chronic exposures, the central nervous system is damaged and results in the disturbance of vision and sensory changes as the most common early symptoms (Sax 1984, p. 641). Lowest lethal dose for humans has been reported at 14 mg/kg or 0.98 grams for a 70 kg person (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Alcoholics and those suffering from neuropsychic trouble are at special risk (*LeFaux 1968).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -22°F, -30°C (CC) (Merck 1983, p. 251)
Flammable Limits:
LEL: 1.3% (*Merck 1983); 1% (*Sunshine 1969)
UEL: 50% (*Merck 1983); 44% (*Sunshine 1969)

Extinguishing Methods: Use dry chemical, carbon dioxide or other inert gas. Cooling and blanketing with water spray is effective in case of fires in metal containers or tanks to help prevent reignition by hot surfaces. Foam is ineffective (NFPA 1984, p. 49-27).

Special Fire Fighting Procedures: If the vapor concentration exceeds 2 percent by volume or is unknown, self-contained breathing mask with full face should be used by all persons entering contaminated area (*CHRIS

CARBON DISULFIDE

SECTION IV (continued)

1978). Wear special protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Ignition temperature dangerously low: 212°F, 100°C (Merck 1983, p. 251). Vapors may be ignited by contact with ordinary light bulb (*NPFA 1978); when heated to decomposition, it emits highly toxic fumes of oxides of sulfur (*Sax 1979).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (Merck 1983, p. 251)
Stable:

Conditions to Avoid: Decomposes on standing for a long time (Merck 1983, p. 251)

Incompatibility (Materials to Avoid): Air, rust, halogens, metal azides, metals, oxidants; when exposed to heat or flame reacts violently with aluminum, chlorine, azides, hypochlorite, ethylamine diamine, ethylene imine, fluorine, metallic azides of lithium, potassium, cesium, rubidium and sodium, nitrogen oxides, potassium, zinc and (sulfuric acid plus permanganate) (Sax 1984, p. 641).

Hazardous Decomposition or Byproducts: When heated to decomposition, emits highly toxic fumes of sulfur oxides and can react vigorously with oxidizing materials (Sax 1984, p. 642).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Carbon disulfide is used in the manufacture of soil disinfectants and vacuum tubes and is used as a solvent for cleaning and extractions, especially in metal treatment and plating. It is a fumigant for commodities, a corrosion inhibitor, and a polymerization inhibitor for vinyl chloride (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

In case of a spill: (1) remove all ignition sources, (2) ventilate area of spill or leak, and (3) for small quantities, absorb on paper towels. Evaporate the spills in a safe place, such as a fume hood. Large quantities can be reclaimed or collected and atomized in a suitable combustion chamber equipped with an appropriate effluent gas-cleaning

CARBON DISULFIDE

SECTION VII (continued)

device (*NIOSH/OSHA 1981). If carbon disulfide is spilled in water, neutralize with agricultural lime, crushed limestone, or sodium bicarbonate. If dissolved, apply activated carbon at ten times the spilled amount. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates (Student 1981, p. 106). Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/MANY
CPE	POOR/MANY
Neoprene	POOR/LIMITED*
Nitrile	POOR/MANY
PE	POOR/MANY
PVC	POOR/LIMITED*
Teflon	POOR/LIMITED
Viton	EXCELLENT/MANY
Viton/Chlorobutyl	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CARBON DISULFIDE

(75-15-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Clear, colorless, or faintly yellow, mobile liquid.

Odor - Slight, sweetly pleasant, ethereal (commercial form is foul smelling).

Commercial Form - Azeotrope with water containing 97.2% carbon disulfide in drums or tank cars.

Uses - Solvent, chemical intermediate; polymerization inhibitor; corrosion inhibitor; agent in metal treatment; anthelmintic; fumigant; manufacture of soil disinfectants, vacuum tubes, and flotation devices.

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Carbon bisulfide, carbon sulfide, dithiocarbonic anhydride, sulphocarbonic anhydride, Weeviltox.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, alcohol, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbitol, Vitamin B6, urea.

CARBON DISULFIDE

Signs and Symptoms of Acute Carbon Disulfide Exposure:

Warning: *Effects may be delayed. Caution is advised.*

Acute exposure to carbon disulfide primarily affects the central nervous system producing signs and symptoms that may include headache, dizziness, difficulty swallowing, nervousness, tremors, mental depression, delirium, psychosis, convulsions, paralysis, and coma. Nausea, vomiting, cyanosis (blue tint to skin and mucous membranes), hypothermia (low body temperature), and peripheral vascular collapse may also occur.

Respiratory effects include coughing, dyspnea (shortness of breath), and respiratory failure. Carbon disulfide is a strong skin irritant; dermal exposure may result in severe burns. Eye exposure may cause degeneration of the retina and optic nerve. Pupils may be dilated.

Emergency Life-Support Procedures:

Acute exposure to carbon disulfide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to carbon disulfide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to carbon disulfide.

CARBON DISULFIDE

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times. Wash initially with soap and water follow with an alcohol wash, then wash again with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: Children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETHYL SULFIDE

CAS Registry Number: 75-18-3

Synonyms: 2-Thiapropane; 2-Thiopropane; Dimethyl Monosulfide; Dimethyl Sulphide; Dimethyl Thioether; DMS, Exact-S; Methane, Thiobis-; Methanethiomethane; Methyl Monosulfide; Methyl Sulphide; Methylthiomethane; Thiobismethane

Chemical Formula: C_2H_6S

Molecular Weight: 62.13

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.031 mg/liter (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 99.7°F, 37.3°C (*Weast 1979)

Specific Gravity (H_2O=1): 0.8483 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): 400 mmHg at 18.7°C (Perry, 1984, p. 3-55)

Melting Point: -144.9°F, -98.27°C (*Weast 1979)

Vapor Density (AIR=1): 2.14 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Weast 1979)

Appearance and Odor: Colorless liquid with an unpleasant, wild radish, cabbage-like odor (*Fenaroli 1975).

DIMETHYL SULFIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Clayton and Clayton 1981-82)
Skin: Yes (*Clayton and Clayton 1981-82)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Dimethyl sulfide causes softening and irritation of the skin. Orally it is an irritant (*Sax 1975). It is a moderate eye irritant (*Clayton and Clayton 1981-82). It is an eye, nose, throat and skin irritant (*CHRIS 1978).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -55°F (*Clayton and Clayton 1981-82)
Flammable Limits:
LEL: 2.2% (*Sax 1979)
UEL: 19.7% (*Sax 1979)

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog or foam (*DOT 1984).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and full protective clothing. Move container from fire area. Cool containers that are exposed to flames with water from the side until well after the fire is out. For massive fire in cargo area, used 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. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (*DOT 1984).

Unusual Fire and Explosion Hazards: 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 (*DOT 1984).

NFPA Flammability Rating: 4

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

DIMETHYL SULFIDE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Reacts vigorously with oxidizing materials (*Sax 1979). Incompatible with dibenzoyl peroxide (Sax 1984, p. 1201).

Hazardous Decomposition or Byproducts: Combustion products include toxic and irritating fumes of sulfur dioxide (Weiss 1980, p. 367).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 367)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is a gas odorant, catalyst impregnator, solvent for anhydrous mineral salts, flavoring ingredient in foods and beverages, chemical intermediate for solvents and dimethyl sulfoxide (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind. Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak. Use water spray to reduce vapors. Take up spills with noncombustible absorbent material (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Move victim to fresh air; 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 (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHYLENE OXIDE

CAS Registry Number: 75-21-8

Synonyms: alpha, beta-Oxidoethane; Anprolene; Dihydrooxirene; Dimethylene Oxide; E O; ETO; NCI-C50088; Oxacyclopropane; Oxane; Oxidoethane; 1,2-Epoxyethane; Oxiran; Oxirane; Oxirene, Dihydro-; Oxyfume; Oxyfume 12; T-Gas

Chemical Formula: C_2H_4O

Molecular Weight: 44.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 51.3°F, 10.7°C (*Sunshine 1969)

Specific Gravity (H_2O=1): 0.8222 at 10°C/10°C (*Sunshine 1969)

Vapor Pressure (mmHg): 1095 at 20°C (NIOSH/OSHA 1978, p. 100)

Melting Point: -170.5°F. -112.5°C (*Sunshine 1969)

Vapor Density (AIR=1): 1.49 (*Environment Canada 1982)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Merck 1976)

ETHYLENE OXIDE

SECTION II (continued)

Appearance and Odor: Colorless gas at room temperature but a mobile liquid below 12°C (54°F) and has a sweet odor (*Merck 1976; *CHRIS 1978)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 ppm (NIOSH 1987, p. 122)

ACGIH TLV: 2 mg/m^3 (1 ppm) (*ACGIH 1984)

IDLH: 800 ppm (*NIOSH/OSHA 1981)

Other Limits Recommended: NIOSH: <0.1 ppm, 8 hour TWA; 5 ppm, 10 minute ceiling (NIOSH 1987 p.122). Industrial substance suspect of carcinogenic potential for humans -- recommended TLV 1 ppm (ACGIH 1984, p. 42). EEGL 20.0 ppm (60 minutes) (NRC 1986, pp. 35-68).

Routes of Entry: **Inhalation:** Yes (*Gilman 1980)
Skin: Yes (Sax 1984, p. 1348)
Ingestion: Yes (Sax 1984, p. 1348)

Health Hazards (Acute, Delayed, and Chronic): It can cause death. Lowest inhalation concentration causing toxic effects is 12500 ppm/10 seconds (*NIOSH/RTECS 1985). It is a strong skin irritant (*CHRIS 1978). Neurological disorders and even death have been reported (*Gilman 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Greater than -18°C (*Sunshine 1969); but less than 0°F (OC) (*CHRIS 1978)
Flammable Limits:
LEL: 3.0% (*Sax 1975)
UEL: 100% (*Sax 1975)

Extinguishing Methods: Extinguish with alcohol foam, carbon dioxide, dry chemical or water spray, fog, or foam. Let burn unless leak can be stopped immediately (*DOT 1984).

Special Fire Fighting Procedures: Move container from fire area if you can do so without risk. Stay away from ends of tanks. Fight fire from maximum distance. 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. Isolate for 1 mile in all directions if tank car or truck is involved in fire. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and full protective clothing. Evacuate area endangered by gas (*DOT 1984).

ETHYLENE OXIDE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Severe explosion hazard when exposed to heat or flame (Sax 1984, p. 1348). Irritating vapors are generated when heated. Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back (*CHRIS 1978). Vapor forms explosive mixtures with air over a wide range (*NFPA 1978). Liquid is not detonable but the vapor may be readily initiated into explosive decomposition (*Bretherick 1979).

NFPA Flammability Rating: 4

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Air, heat, acids and bases (Sax 1984, p. 1348); metal or metal chloride catalysts (*NFPA 1978)

Incompatibility (Materials to Avoid): Metal fittings containing copper, silver, mercury or magnesium; ammonia (*Bretherick 1979); oxidizing agents; acids, organic bases; amines; certain salts; alcohols; mercaptans (*General Electric Co. 1980, MSDS #433); ferric chloride; magnesium perchlorate; m-nitroaniline; trimethylamine (*ITI 1982); potassium, tin chlorides; alkanethiols; bromoethane; aluminum chloride; aluminum oxide; iron chlorides; and iron oxides (Sax 1984, p. 1348).

Hazardous Decomposition or Byproducts: Decomposition products are explosive (*ITI 1982).

Hazardous Polymerization: **May Occur:** Yes (*Sax 1975)
May Not Occur:

Conditions to Avoid: Acids; covalent halides such as chlorides of aluminum, iron (III), tin (IV); basic materials like alkali hydrides, ammonia, amines, and potassium; catalytically active solids such as aluminum or iron oxides or rust (*Bretherick 1975); chlorides of boron, aluminum, tin, and iron; some carbonates; and metals such as copper and copper alloys (*Patty 1963)

SECTION VI -- USE INFORMATION

Ethylene oxide is a chemical intermediate for ethylene glycol, nonionic surfactants, glycol ethers, ethanolamines, triethylene glycol, and polyethylene glycol (*SRI). Used as a fumigant for foodstuffs and textiles, for sterilizing surgical instruments, and as an agricultural fungicide (Merck 1983, p. 550). Registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

ETHYLENE OXIDE

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). Shut off ignition sources; do not allow flares, smoking or flames in the hazard area. Stop leak if you can do so without risk. Use water spray to reduce vapors; do not get water inside container. For small spills flush area with flooding amounts of water. For large spills dike spill for later disposal. (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED*
CPE	GOOD/LIMITED*
Neoprene	POOR/LIMITED*
Nitrile	POOR/MANY
PVC	POOR/LIMITED*
Viton	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ETHYLENE OXIDE

(75-21-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless gas; mobile liquid below 12 degrees C (54 degrees F) or under pressure.

Odor - Sweet, etherlike.

Commercial Forms - Mixtures with carbon dioxide or fluorocarbon 12.

Uses - Chemical intermediate for ethylene glycol, nonionic surfactants, glycol ethers, ethanolamines, triethylene glycol, polyethylene glycol; fumigant, fungicide, ripening agent for fruits; sterilizing surgical instruments.

Materials to Avoid - Acids, alcohols, amines, ammonia, oxidizers, metal catalysts.

Caution: *Explosion potential is high. Avoid all heat sources including fire.*

Other Names - Anprolene, dihydrooxirene, 1,2-epoxyethane, oxacyclopropane, oxane, oxidoethane, oxirane, oxyfume.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Ethylene Oxide Exposure:

Warning: *Ethylene oxide is corrosive to moist tissues. Caution is advised.*

Signs and symptoms of acute exposure to ethylene oxide may be severe, and include dyspnea (shortness of breath), cough, pulmonary edema, pneumonia, and respiratory failure. Lethargy, headache, dizziness, twitching, convulsions, paralysis, and coma may be observed. Cardiac arrhythmias and cardiovascular collapse may also occur.

ETHYLENE OXIDE

Gastrointestinal effects of acute exposure may include nausea, vomiting, and abdominal pain. Ethylene oxide may severely irritate or burn mucous membranes and moist skin. Eye contact may result in conjunctivitis (red, inflamed eyes) and erosion of the cornea.

Emergency Life-Support Procedures:

Acute exposure to ethylene oxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to ethylene oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to ethylene oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be IMMEDIATELY flushed with lukewarm water for AT LEAST 15 minutes.

5. If liquid is spilled on the skin, allow ethylene oxide to vaporize before washing THOROUGHLY with soap and water.

ETHYLENE OXIDE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Ethylene oxide generally acts as its own cathartic; however, if deemed necessary, excretion may be promoted by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSGENE

CAS Registry Number: 75-44-5

Synonyms: Carbon Oxychloride; Carbonyl Chloride; CG; Chloroformyl Chloride; NCI-C60219; Carbon Dichloride Oxide; Carbonic Acid Dichloride; Carbonic Dichloride; Carbonyl Dichloride; Phosgen

Chemical Formula: CCl_2O

Molecular Weight: 98.92

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 10 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 47°F, 8.2°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.432 at 0°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 1215 at 20°C (*Merck 1976)

Melting Point: -180°F, -118°C (*Merck 1976)

Vapor Density (AIR=1): 3.4 (*NFPA 1975)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (*Merck 1976)

PHOSGENE

SECTION II (continued)

Appearance and Odor: Colorless gas; colorless, fuming liquid; suffocating odor reminiscent of moldy hay (*Merck 1976). In dilute concentration has odor of green corn (*Arena 1974); odor similar to decaying fruit at room temperature (*Encyc Occupat Health and Safety 1971).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.4 mg/m^3 (0.1 ppm) (NIOSH 1987, p. 192).

ACGIH TLV: TWA 0.4 mg/m^3 (0.1 ppm) (ACGIH 1986-87, p. 27).

IDLH: 2 ppm (NIOSH 1987, p. 192)

Other Limits Recommended: NIOSH: 0.1 ppm (10 hour TWA); Ceiling 0.2 ppm for 15 minutes (NIOSH 1987, p. 192). EEGL 0.2 ppm (60 minutes) (NRC 1984b, pp. 69-86).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*DOT 1984)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Phosgene is a lung toxicant that causes damage to the capillaries, bronchioles and alveoli of the lungs (U.S. Army 1975, p. 3-1) by decomposition to hydrochloric acid. There is little immediate irritant effect upon the respiratory tract, and the warning properties of the gas are therefore very slight. Pulmonary edema, bronchopneumonia and occasionally lung abscesses develop. Degenerative changes in the nerves have been reported as later developments. A concentration of 25 ppm is dangerous for exposures lasting 30-60 minutes and 50 ppm is rapidly fatal after even short exposure (Sax 1984, p. 2210).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Nonflammable (NFPA 1984, p. 49-73). For small fires, use dry chemical or carbon dioxide. Use water spray, fog, or foam for larger fires. Do not get water inside containers. Move container from fire area if you can do so without risk. Stay away from the ends of tanks, and cool exposed containers with water until well after the fire is out. Isolate the area until gas has dispersed (*DOT 1984).

Special Fire Fighting Procedures: If necessary to stop flow of gas, use water spray to protect the personnel effecting shutoff. Sodium hydroxide or anhydrous ammonia have been used to neutralize phosgene (*NFPA 1975).

PHOSGENE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: When heated to decomposition or on contact with water or steam, it will react to produce toxic and corrosive fumes (*Sax 1975).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes, in steel containers if dry (U.S. Army 1975, p. 3-1)

Conditions to Avoid: Moisture (*Sax 1975)

Incompatibility (Materials to Avoid): Reacts violently with aluminum; tert-butyl azido formate; 2,4-hexadiyn-1,6-diol; isopropyl alcohol; potassium; sodium; hexafluoro isopropylidene; amino lithium; lithium (Sax 1984, p. 2211).

Hazardous Decomposition or Byproducts: When heated to decomposition or on contact with water or steam, it will react to produce toxic and corrosive fumes (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Delayed-action military chemical agent (U.S. Army 1975, p. 3-1). Chemical intermediate for toluene diisocyanate, methyl isocyanate, acyl chlorides, diphenylmethane-4,4'-diisocyanate, chloroformate esters, diethyl carbonate, dimethyl carbamoyl chloride, polymethylene polyphenylisocyanate, polycarbonate resins (*SRI); aniline dyes (*Hamilton 1974); pesticides, herbicides, dyes (Hawley 1981, p. 807).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering.

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating,

PHOSGENE

SECTION VIII (continued)

chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHOSGENE

(75-44-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Easily liquefied colorless gas or colorless to light yellow liquid.

Odor - Strong and stifling when concentrated, haylike in dilute form.

Commercial Form - 99% pure liquefied gas.

Uses - Organic synthesis; chemical intermediate for isocyanates, acid chlorides, and polycarbonates; pesticides; herbicides; dye manufacture; chemical warfare agent.

Materials to Avoid - Active metals, aluminum, alcohol, water (except for use in emergency life support).

Caution: *Hydrochloric acid will be liberated upon contact with water, steam, or alcohols. A violent reaction will occur following contact with aluminum and active metals. Phosgene will produce toxic and corrosive fumes when heated to decomposition; avoid sources of extreme heat.*

Other Names - Carbon oxychloride, carbonic acid dichloride, carbonyl chloride, chloroformyl chloride, diphosgene.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate, dimercaprol.

Signs and Symptoms of Acute Phosgene Exposure:

Warning: *Effects may be delayed up to 24 hours. Caution is advised.*

PHOSGENE

Acute exposure to phosgene may result in severe irritation and burns of the skin, eyes, mucous membranes, and respiratory passages. Cough, dyspnea (shortness of breath), pain in the chest, and severe pulmonary edema may also occur. Cyanosis (blue tint to the skin and mucous membranes) and anxiety may be observed.

Emergency Life-Support Procedures:

Acute exposure to phosgene may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phosgene.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phosgene.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

PHOSGENE

7. RUSH to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPYLENEIMINE

CAS Registry Number: 75-55-8

Synonyms: Aziridine, 2-Methyl-; 2-Methylazacyclopropane; 2-Methylaziridine; 2-Methylethylenimine; Methylethylenimine; Propylenimine; Propylene Imine

Chemical Formula: C_3H_7N

Molecular Weight: 57.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 19 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10,000 (pounds)

RQ: 1 (pounds) (statutory)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 151-153°F, 66-67°C (*Encyc Occupat Health and Safety 1983)

Specific Gravity (H_2O=1): 0.8039-0.8070 at 25°C/25°C (Hawley 1981, p. 865)

Vapor Pressure (mmHg): 112 at 20°C (*IARC 1972-1985)

Melting Point: -85°F, -65°C (*IARC 1972-1985)

Vapor Density (AIR=1): 2.0 (*Encyc Occupat Health and Safety 1983)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*IARC 1972-1985)

Appearance and Odor: Colorless, oily liquid with an odor similar to aliphatic amines (i.e., fishy) (*IARC 1972-1985)

PROPYLENEIMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 5 mg/m^3 (2 ppm) (NIOSH 1987, p. 200)

ACGIH TLV: TWA 5 mg/m^3 (2 ppm) (skin) (ACGIH 1986-1987, p. 28)

IDLH: 500 ppm (NIOSH 1987, p. 200)

Other Limits Recommended: Industrial substance suspect of carcinogenic potential to man (*ACGIH 1983)

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 865)
Skin: Yes (Hawley 1981, p. 865)
Ingestion: Yes (Hawley 1981, p. 865)

Health Hazards (Acute, Delayed, and Chronic): Toxic after acute exposure. Can severely irritate eyes, skin, and lungs (*Encyc Occupat Health and Safety 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 25°F (CC) (*ACGIH 1980)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: If material is on fire, use foam, carbon dioxide, or dry chemical (Student 1981, p. 433).

Special Fire Fighting Procedures: If material is on fire, do not extinguish fire unless flow can be stopped. Use water in flooding quantities as a "fog" and use to cool all affected containers. Keep material out of water sources and sewers. Build dikes to contain flow as necessary (Student 1981, p. 433). Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 30).

Unusual Fire and Explosion Hazards: Chemical is extremely flammable; vapors are heavier than air (Student 1981, pp. 433).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Thermally unstable (Student 1981, p. 433)
Stable:

Conditions to Avoid: Not Found

PROPYLENEIMINE

SECTION V (continued)

Incompatibility (Materials to Avoid): Acids, strong oxidizers (NIOSH/OSHA 1978, p. 160)

Hazardous Decomposition or Byproducts: Toxic oxides of nitrogen are produced during combustion (Student 1981, p. 433).

Hazardous Polymerization: May Occur: Yes (Student 1981, p. 433)
May Not Occur:

Conditions to Avoid: Contact with acid promotes violent polymerization (Student 1981, p. 433)

SECTION VI -- USE INFORMATION

Propyleneimine is used as a chemical intermediate in the modification of latex surface coating resins, polymers in textile and paper industries, dyes, photography, gelatins, oil additives and organic synthesis. It is a comonomer for polymers with methacrylic acid and esters (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors; avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap with water. Use water spray to disperse vapors and dilute standing pools of liquid. Keep sparks and flames away. Attempt to stop leak if it can be done without hazard. (Student 1981, p. 433).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inflammation and blistering of the skin, eye and upper respiratory tract; irritation, nausea, itching, and periodic vomiting. Headache, dizziness, and pain in the temple. Shortness of breath, and increased nasal and laryngeal secretion are seen (*Encyc Occupat Health and Safety 1983).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If victim is not breathing, give artificial respiration; if breathing is labored, give oxygen. In case of eye/skin contact, immediately flush with water for at least 15 minutes (DOT 1984,

PROPYLENEIMINE

SECTION IX (continued)

Guide 30). Neutralization with acids (e.g., vinegar, fruit juices) is contraindicated. Avoid vomiting (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPYLENE OXIDE

CAS Registry Number: 75-56-9

Synonyms: 1,2-Epoxypropane; Epoxypropane; Ethylene Oxide, Methyl-; Methyl Ethylene Oxide; Methyl Oxirane; Methyloxirane; NCI-C50099; Oxirane, Methyl-; Propane, 1,2-Epoxy-; Propane, Epoxy; Propene Oxide; Propylene Epoxide; Propyleneoxide; 1,2-Propylene Oxide

Chemical Formula: C_3H_6O

Molecular Weight: 58.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 93.61°F, 34.23°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.859 at 0°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 445 at 20°C (*Sunshine 1969)

Melting Point: -169.83°F, -112.13°C (*Merck 1976)

Vapor Density (AIR=1): 2.0 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 40.5% by weight at 20°C (*Merck 1976)

PROPYLENE OXIDE

SECTION II (continued)

Appearance and Odor: Colorless liquid (*Merck 1976) with sweet, alcoholic odor like natural gas, ether, or benzene (*Clayton and Clayton 1981-82)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 240 mg/m^3 (100 ppm) (NIOSH 1987, p. 200)

ACGIH TLV: TWA 50 mg/m^3 (20 ppm) (*ACGIH 1983)

IDLH: 2000 ppm (NIOSH/OSHA 1978, p. 160)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Clayton and Clayton 1981-82)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): This material is moderately toxic by inhalation and ingestion. It may cause irreversible and reversible changes (*Sax 1975). Skin contact with the material or solutions of the material cause irritation; diluted solutions are more irritating than undiluted materials (*Encyc Occupat Health and Safety 1971). Exposure may cause mild depression of the central nervous system and eye, nasal, and lung irritation (*Rumack 1975 to Present). Contact with the liquid can cause blindness and death. Pulmonary edema may recur up to 2 weeks after exposure (*Morgan 1982).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -35°F, -37°C (CC) (*Sunshine 1969)
Flammable Limits:
LEL: 2.8% (*Sax 1979)
UEL: 37% (*Sax 1979)

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog or foam (DOT 1984, Guide 26).

Special Fire Fighting Procedures: Firefighting should be done from a safe distance or from a protected location (*NFPA 1978). Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. Move container from area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. 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 (DOT 1984, Guide 26).

PROPYLENE OXIDE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Vapor is heavier than air and may travel considerable distance to source of ignition and flash back. Vapors form explosive mixture with air. If polymerization takes place in container, there may be a violent rupture of container (*NFPA 1978). Explosion hazard is severe when exposed to flame (*Sax 1979).

NFPA Flammability Rating: 4

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 787)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Violently reacts with acetylide-forming metals such as copper or copper alloys (*Clayton and Clayton 1981-82); ammonium hydroxide; chlorosulfonic acid; hydrochloric acid; hydrofluoric acid; nitric acid; oleum and sulfuric acid (Sax 1984, p. 1289).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Yes (*Clayton and Clayton 1981-82)
May Not Occur:

Conditions to Avoid: Active catalytic surfaces such as anhydrous chlorides of iron, tin, and aluminum; peroxides of iron and aluminum; and alkali metal hydroxides (*NFPA 1987); high temperatures; alkalies; aqueous acids; amines and acidic alcohols (Weiss 1980, p. 787).

SECTION VI -- USE INFORMATION

This material is used primarily as a chemical intermediate for polyurethane polyols, propylene glycol, and dipropylene glycol (*SRI). It is also used for sterilization of packaged foods (*Farm Chemicals Handbook 1983), as a herbicide (*Clayton and Clayton 1981-82), in the preparation of lubricants, surfactants, and oil demulcifiers, and as a fumigant and soil sterilant (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill or leak. Do not allow the material to enter confined space, such as a sewer, because of the possibility of an explosion (*NIOSH/OSHA 1981). Stop discharge if possible. Stay upwind and use water spray to knock down vapor. Avoid contact with liquid and vapor (Weiss 1980, p. 787). Water spray may be used to flush spills away from exposure and to dilute spills to nonflammable mixture (*NFPA

PROPYLENE OXIDE

SECTION VII (continued)

1978). Shut off ignition sources; no flares, smoking, or flames in hazard area. Stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 26).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
Butyl/Neoprene	POOR/LIMITED*
Neoprene	POOR/LIMITED*
Nitrile	POOR/LIMITED*
PE	POOR/MANY
PVC	POOR/LIMITED*
Teflon	GOOD/LIMITED
Viton	POOR/MANY
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PROPYLENE OXIDE

(75-56-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless liquid or gas above 34 degrees C (94 degrees F).

Odor - Sweet, alcohollike.

Commercial Form - Mixed with carbon dioxide.

Uses - Manufacturer of polyurethane, polyols, propylene glycol, and dipropylene glycol; fumigant; solvent.

Materials to Avoid - Acids, alkali, oxidizers, metals.

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Epoxypropane, methyl ethylene oxide, methyl oxirane, propene oxide, propylene epoxide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, aminophylline, morphine, furosemide, epinephrine, atropine.

Signs and Symptoms of Acute Propylene Oxide Exposure:

Propylene oxide may irritate or burn the skin, eyes, and respiratory tract. Pulmonary edema may occur up to 2 weeks after exposure. Dermatitis (red, inflamed skin) is common. Other signs and symptoms of acute exposure may include headache, nausea, vomiting, and unconsciousness. Victims may appear as if they are in a drunken stupor.

PROPYLENE OXIDE

Emergency Life-Support Procedures:

Acute exposure to propylene oxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to propylene oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to propylene oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

PROPYLENE OXIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TETRAMETHYLLEAD

CAS Registry Number: 75-74-1

Synonyms: Lead Tetramethyl; Methylplumbane; TML; Tetramethyl Lead

Chemical Formula: $C_4H_{12}Pb$

Molecular Weight: 267.33

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Lead Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 230°F, 110°C at 10 mmHg (*IARC 1972-1985); decomposes above 212°F, 100°C (*NFPA 1975)

Specific Gravity (H_2O=1): 1.995 (*Weast 1976)

Vapor Pressure (mmHg): 22 at 20°C (NIOSH/OSHA 1978, p. 176)

Melting Point: -17.5°F, -27.5°C (*Weast 1976)

Vapor Density (AIR=1): 6.5 (NFPA 1984, p. 325M-87)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*IARC 1972-1985)

TETRAMETHYLLEAD

SECTION II (continued)

Appearance and Odor: Colorless liquid (*Encyc Occupat Health and Safety 1971); dyed red, orange or blue with a slight musty odor (NIOSH/OSHA 1978, p. 176).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.075 mg (Lead)/m^3 (OSHA 1984, p. 663)

ACGIH TLV: TWA 0.15 mg (Lead)/m^3 (skin) (ACGIH 1986-87, p.30)

IDLH: 40 mg(Lead)/m^3 (NIOSH 1987, p. 222)

Other Limits Recommended: Maximum air concentration: 0.15 mg/m^3 (skin) (*Casarett 1975)

Routes of Entry: **Inhalation:** Yes (*NFPA 1975)
Skin: Yes (*NFPA 1975)
Ingestion: Yes (*NFPA 1975)

Health Hazards (Acute, Delayed, and Chronic): Vapors are very toxic. Fatal lead poisoning may occur by ingestion, vapor inhalation or skin absorption (*NFPA 1975). Several cases of acute toxicity, usually in the form of degenerative brain disease, have been described following occupational exposure (*IARC 1972-1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 38°C (*IARC 1972-1985)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: On fires in which containers are not exposed, use water spray, dry chemical, foam or carbon dioxide (*NFPA 1975).

Special Fire Fighting Procedures: Use water to keep fire exposed containers cool. If leak or spill has not ignited, use water spray to disperse vapors or flush spill (*NFPA 1975). For massive fire in cargo area, use unmanned hose holder or monitor nozzle; if this is impossible withdraw from area and let fire burn (*DOT 1984).

Unusual Fire and Explosion Hazards: Thermal decomposition is likely to take the form of vapors at the surface. Rapid decomposition will cause container to explode (*NFPA 1975). Dangerous fire hazard when exposed to heat, flame, or oxidizers (Sax 1984, p. 2546).

NFPA Flammability Rating: 3

TETRAMETHYLLEAD

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 865)

Conditions to Avoid: Fire, heat, physical damage, and strong oxidizers (*NFPA 1975). Starts to decompose at about 212°F (100°C). If confined, may explode or detonate at high temperatures (Weiss 1980, p. 865).

Incompatibility (Materials to Avoid): Strong oxidizers such as sulfuryl chloride or potassium permanganate (NIOSH/OSHA 1978, p. 176).

Hazardous Decomposition or Byproducts: Toxic gases are generated in fire (Weiss 1980, p. 865).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 865)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Antiknock additive for gasolines; component of mixed alkyl leads for gasoline additives (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TETRAMETHYLLEAD

(75-74-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Musty or fruity.

Commercial Form - Red, orange, or blue liquid.

Use - Gasoline additive.

Materials to Avoid - Oxidizers.

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire. When burned, toxic fumes of lead oxide will be emitted.*

Other Names - Tetramethylplumbane, TML.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbitol, mannitol, dexamethasone.

Signs and Symptoms of Acute Tetramethyllead Exposure:

Warning: *Effects may be delayed for hours to days. Caution is advised.*

Signs and symptoms of acute exposure to tetramethyllead may be severe and include anxiety, irritability, headache, insomnia, disorientation, violent/frightening dreams, hyperexcitability, delusions, and hallucinations. Muscular weakness, tremor, incoordination, convulsions, cerebral edema, and coma may occur. A metallic taste may be noted. Sneezing, bronchitis, and pneumonia may be noted. Bradycardia (slow heart rate), hypotension (low blood

pressure), hypothermia, and pallor may also occur. Gastrointestinal symptoms include vomiting and diarrhea. Tetramethyllead may irritate moist skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to tetramethyllead may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to tetramethyllead.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to tetramethyllead.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

TETRAMETHYLLEAD

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: Children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIMETHYLCHLOROSILANE

CAS Registry Number: 75-77-4

Synonyms: Chlorotrimethylsilane; Monochlorotrimethylsilicon; Silane, Chlorotrimethyl-; Silane, Trimethylchloro-; Silicane, Chlorotrimethyl; Silylium, Trimethyl-, Chloride; Trimethyl Chlorosilane; Trimethylsilyl Chloride

Chemical Formula: C_3H_9ClSi

Molecular Weight: 108.66

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse) 0.5 mg/liter/10 minute (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 135°F, 57°C (*Hawley 1977)

Specific Gravity (H_2O=1): 0.854 at 25°C (*Hawley 1977)

Vapor Pressure (mmHg): Not Found

Melting Point: -72°F, -57.7°C (*Weast 1984)

Vapor Density (AIR=1): 3.7 (*CHRIS 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water (*Hawley 1977)

Appearance and Odor: Colorless liquid (*Hawley 1977), with a sharp hydrochloric acid-like odor (*CHRIS 1978).

TRIMETHYLCHLOROSILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Hawley 1977; *Rumack 1975 to Present)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Similar to other silanes. Toxicity is rated high for inhalation, ingestion and local irritation. May cause death or permanent injury after a very short exposure to small quantities (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -18°F (*Hawley 1977); 0°F (OC) (*CHRIS 1978)
Flammable Limits:
LEL: 1.8% (*CHRIS 1978)
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemicals or carbon dioxide. Do not use water or foam. Cool exposed containers with water (*CHRIS 1978). Water spray, fog, or foam may be required to fight large fires. However, trimethylchlorosilane may react violently with water. Do not get water inside containers (*DOT 1984).

Special Fire Fighting Procedures: Use acid-vapor-type respirator, rubber gloves, chemical worker's goggles, and other protective equipment as necessary to protect skin and eyes (*CHRIS 1978).

Unusual Fire and Explosion Hazards: Violent reaction with water (Sax 1984, p. 2665). Toxic and irritating hydrogen chloride and phosgene may be formed in fires. Difficult to extinguish, re-ignition may occur. Flashback along vapor trail may occur. Containers may explode in fire. Vapor may explode if ignited in enclosed area (CHRIS 1987).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 895, *CHRIS 1978)

Conditions to Avoid: Avoid contact with water; it readily hydrolyzes, liberating hydrochloric acid (*Hawley 1977).

TRIMETHYLCHLOROSILANE

SECTION V (continued)

Incompatibility (Materials to Avoid): Reacts with surface moisture, releasing hydrogen chloride, which will corrode common metals and form flammable hydrogen gas (*CHRIS 1978).

Hazardous Decomposition or Byproducts: When heated to decomposition or on contact with acids or acid fumes, chloride fumes are emitted (*Sax 1979).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 895)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate for silicone fluids, silylating agent, and a component of a catalyst for propylene oxide (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). In case of spill or leak, shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material. Stop leak if you can do it without risk. Do not get water inside container. For small spills, take up with sand or other non-combustible absorbent material and place into container for later disposal. For large spills, dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TRIMETHYLCHLOROSILANE

(75-77-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Sharp, acrid.

Commercial Form - 98% pure liquid.

Uses - Catalyst, solvent, silylating agent, manufacture of silicone fluids.

Material to Avoid - Water (except for use in emergency life support).

Caution: *Highly flammable. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Chlorotrimethylsilane, trimethylsilyl chloride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Trimethylchlorosilane Exposure:

Warning: *In the presence of water, trimethylchlorosilane liberates hydrochloric acid, which is extremely corrosive. Caution is advised.*

Signs and symptoms of acute trimethylchlorosilane exposure may include increased salivation, intense thirst, difficulty swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance.

TRIMETHYLCHLOROSILANE

Acute inhalation exposure may result in hoarseness, laryngitis, a feeling of suffocation, dyspnea (shortness of breath), choking, respiratory tract irritation, chest pain, and pulmonary edema. The potential for circulatory collapse is high following ingestion of trimethylchlorosilane. Sneezing, bleeding of the nose and gums, and ulceration of the nasal and oral mucosa may also occur. Renal toxicity has been observed in animals.

If the eyes come in contact with trimethylchlorosilane, irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure is generally followed by dermatitis (red, inflamed skin), severe burns, pain, and shock.

Emergency Life-Support Procedures:

Acute exposure to trimethylchlorosilane may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to trimethylchlorosilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to trimethylchlorosilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

TRIMETHYLCHLOROSILANE

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Rinse mouth with large amounts of water. Inform victims not to swallow this water.

3. DO NOT induce vomiting or attempt to neutralize!

4 Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: Children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETHYLDICHLOROSILANE

CAS Registry Number: 75-78-5

Synonyms: Dichlorodimethylsilane; Dichlorodimethylsilicon; Inerton AW-DMCS; Silane, Dichlorodimethyl-

Chemical Formula: $C_2H_6Cl_2Si$

Molecular Weight: 129.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation: (mouse) 0.0003 mg/liter/2 hour (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 158°F, 70°C (NFPA 1984, p. 325M-42)

Specific Gravity (H_2O=1): 1.1 (NFPA 1984, p. 325M-42)

Vapor Pressure (mmHg): 100 at 17.5°C (Weast 1984, p. D-200)

Melting Point: -123°F, -86°C (*CHRIS 1978)

Vapor Density (AIR=1): 4.45 (NFPA 1984, p. 352M-42)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (NFPA 1984, p. 325M-42)

Appearance and Odor: Colorless liquid with sharp irritating odor (*CHRIS 1978).

DIMETHYLDICHLOROSILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*CHRIS 1978)
Skin: Yes (*CHRIS 1978)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Inhalation irritates mucous membranes. Severe gastrointestinal damage may occur. Vapors cause severe eye and lung injury. Upon short contact, second and third degree burns may occur (*CHRIS 1978).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 16°F (OC) (*Hawley 1977)
Flammable Limits:
LEL: 3.4% (*Sax 1975)
UEL: 9.5% (*Sax 1975)

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam. Move container from fire area if it can be done without risk. Do not get water inside container. Cool containers that are exposed to fire from outside until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or discoloration of tank due to fire (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Avoid contact with skin, eyes, or clothing. Wear acid-vapor respirator, rubber gloves, chemical worker's goggles, other protective and corrosive-resistant equipment as needed (*CHRIS 1978; *Encyc Occupat Health and Safety 1971). Runoff from fire control or dilution water may cause pollution. Isolate for one-half mile in all directions if tank car or truck involved in fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: Vapor may explode if ignited in an enclosed area; reacts with water to produce irritating and toxic gases. Toxic and irritating hydrogen chloride and phosgene may form in fire (CHRIS 1987). Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 29).

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980)

DIMETHYLDICHLOROSILANE

SECTION V -- REACTIVITY DATA (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Reacts vigorously with water to generate hydrogen chloride (*CHRIS 1978).

Hazardous Decomposition or Byproducts: Reacts with water; irritating gas is produced. Hydrogen chloride and phosgene gases may be formed upon heating (CHRIS 1987).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate for silicone fluids and in ethchlorvynol assays (*SRI; *AOAC 1965).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled materials; stop leak if you can do so without risk. Use water spray to reduce vapors; however do not get water inside containers. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 29). Use effective fume removal device (*AOAC 1965).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	GOOD/LIMITED**
Nitrile	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

DIMETHYLDICHLOROSILANE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIMETHYLDICHLOROSILANE

(75-78-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Sharp, irritating.

Commercial Form - Liquid in steel drums.

Use - Manufacture of silicone products.

Material to Avoid - Water (except for use in emergency life support).

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire. Dimethylchlorosilane will liberate hydrochloric acid upon contact with water.*

Other Names - Dichlorodimethylsilane, dichlorodimethylsilicon, Inerton AW-DMCS.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Dimethyldichlorosilane Exposure:

Signs and symptoms of acute ingestion of dimethyldichlorosilane may be severe and include increased salivation, intense thirst, difficulty swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of dimethyldichlorosilane.

DIMETHYLDICHLOROSILANE

Acute inhalation exposure may result in sneezing, choking, laryngitis, dyspnea (shortness of breath), respiratory tract irritation, and chest pain. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, pulmonary edema, chronic bronchitis, and pneumonia may also occur.

If the eyes have come in contact with dimethyldichlorosilane, irritation, pain, swelling, corneal erosion, and blindness may result. Dermatitis (red, inflamed skin), severe burns, pain, and shock generally follow dermal exposure.

Emergency Life-Support Procedures:

Acute exposure to dimethyldichlorosilane may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to dimethyldichlorosilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to dimethyldichlorosilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

DIMETHYLDICHLOROSILANE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Rinse mouth with large amounts of water. Inform victims not to swallow this water.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: Children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYLTRICHLOROSILANE

CAS Registry Number: 75-79-6

Synonyms: Methylsilyl Trichloride; Silane, Methyltrichloro-; Silane, Trichloromethyl-; Trichloromethylsilane; Trichloromethylsilicon

Chemical Formula: CH_3Cl_3Si

Molecular Weight: 149.48

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.00018 mg/liter/2 hour (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 152°F, 66.5°C (*Clayton and Clayton 1981-82)

Specific Gravity (H_2O=1): 1.27 at 25°C (*CHRIS 1978)

Vapor Pressure (mmHg): Not Found

Melting Point: -108°F, -77.8°C (Weast 1983, p. C-515)

Vapor Density (AIR=1): 5.17 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Acrid odor, sharp like hydrochloric acid, colorless liquid (*CHRIS 1978).

METHYLTRICHLOROSILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): As with other chlorosilanes, acute exposures may be highly toxic and may cause death or permanent injury after very short exposures to small quantitites. Chronic exposures may be moderately toxic and involve irreversible and reversible changes (*Sax 1975). Skin contact may produce severe burns with pain and risk of secondary infections. Ingestion may produce oral, esophageal, and stomach burns, intensity will vary from mild to very severe, gastrointestinal damage is rare but may occur (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 45°F (OC); 15°F (CC) (*CHRIS 1978)
Flammable Limits:
LEL: 7.6% (*NFPA 1978)
UEL: 20% (*NFPA 1978)

Extinguishing Methods: Dry chemical or carbon dioxide may be used for small fires. Water may be used for large fires if firefighters are protected from violent reaction of methyltrichlorosilane with water. Water may be used to keep containers cool (*NFPA 1978).

Special Fire Fighting Procedures: Self-contained breathing apparatus is required as combustion/decomposition yields acid gases/pulmonary irritants. Corrosion-resistant protective clothing, as well as appropriate foot, hand, arm, head, eye, and face protection are required where contact is possible (*Encyc Occupat Health and Safety 1971).

Unusual Fire and Explosion Hazards: Toxic hydrogen chloride and phosgene gases may form in fires. Reacts with water to form hydrochloric acid (CHRIS 1987). Vapor forms flammable mixture with air (*NFPA 1978). May form explosive mixture in air (*Hawley 1977).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Hawley 1977; *CHRIS 1978)
Stable:

METHYLTRICHLOROSILANE

SECTION V -- REACTIVITY DATA (continued)

Conditions to Avoid: Contact with water or moist air (*NFPA 1978, *Sax 1979).

Incompatibility (Materials to Avoid): Reacts with water or steam to form hydrochloric acid (*CHRIS 1978).

Hazardous Decomposition or Byproducts: Hydrogen chloride and phosgene formed in fires (*CHRIS 1978).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Monomer for silicone resins (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Spills can be neutralized by flushing with large quantities of water followed by treatment with sodium bicarbonate. Provide adequate protection against generated hydrogen chloride. Do not allow water to get into container since resulting pressure could cause container to rupture (*NFPA 1978). Protect against potentially violent reaction with water (see Section III above). Avoid breathing vapors and contact with skin (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for METHYLTRICHLOROSILANE

(75-79-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Sharp, acrid.

Commercial Form - Liquid in 55-gallon drums or 1-gallon glass bottles.

Use - Manufacture of silicones.

Material to Avoid - Water (except for use in emergency life support).

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Methylsilyltrichloride, trichloromethylsilane, trichloromethylsilicon.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Methyltrichlorosilane Exposure:

Warning: *In the presence of water, methyltrichlorosilane liberates hydrochloric acid, which is extremely corrosive. Caution is advised.*

Signs and symptoms of acute ingestion of methyltrichlorosilane may include excessive salivation, intense thirst, difficulty in swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of methyltrichlorosilane.

METHYLTRICHLOROSILANE

Acute inhalation exposure may result in hoarseness, laryngitis, a feeling of suffocation, dyspnea (shortness of breath), choking, respiratory tract irritation, chest pain, and pulmonary edema. Sneezing, bleeding of the nose and gums, and ulceration of the nasal and oral mucosa may also occur. Renal toxicity has been observed in animals.

If the eyes have come in contact with methyltrichlorosilane, then irritation, pain, swelling, corneal erosion, and blindness may result. Dermatitis (red, inflamed skin), severe burns, pain, and shock generally follow dermal exposure.

Emergency Life-Support Procedures:

Acute exposure to methyltrichlorosilane may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methyltrichlorosilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methyltrichlorosilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

METHYLTRICHLOROSILANE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Rinse mouth with large amounts of water. Inform victims not to swallow this water.

3. DO NOT induce vomiting or attempt to neutralize!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ACETONE CYANOHYDRIN

CAS Registry Number: 75-86-5

Synonyms: 2-Cyano-2-Propanol; 2-Hydroxy-2-Methylpropionitrile; 2-Hydroxyisobutyronitrile; 2-Methyllactonitrile; 2-Propanone, Cyanohydrin; alpha-Hydroxyisobutyronitrile; Lactonitrile, 2-Methyl-; Propanenitrile, 2-Hydroxy-2-Methyl-; USAF RH-8

Chemical Formula: C_4H_7NO

Molecular Weight: 85.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (Guinea Pig) 9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 180°F, 82°C at 23 mmHg (Weast 1983, p. C-209)

Specific Gravity (H_2O=1): 0.9267 at 25°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 0.8 at 20°C (*Clayton and Clayton 1981-82)

Melting Point: -2.2°F, -19°C (*Merck 1976)

Vapor Density (AIR=1): 2.93 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble in water (*Merck 1976)

Appearance and Odor: Colorless liquid (*Hawley 1977); distinct strong cyanide odor (*Lefaux 1968)

ACETONE CYANOHYDRIN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Patty 1963)
Skin: Yes (*Patty 1963)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): This material is considered very hazardous and should only be handled under conditions that prevent any inhalation of vapor or skin contact (*Patty 1963). May be slightly irritating to skin and mucous membranes (*Merck 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 165°F, 74°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 2.2% (*NFPA 1978)
UEL: 12% (*NFPA 1978)

Extinguishing Methods: Water may cause frothing if it gets below surface of liquid and turns to steam. Water fog gently applied to surface will cause frothing which will extinguish fire. Use water spray, dry chemical, alcohol foam, or carbon dioxide. Use water to keep fire-exposed containers cool, from a safe distance (*NFPA 1978).

Special Fire Fighting Procedures: Wear air-supplied mask with canister approved for use with acrylonitrile in less than 2 percent concentration, rubber or plastic gloves, cover goggles or face mask, rubber boots, slicker suit, safety helmet (*CHRIS 1978).

Unusual Fire and Explosion Hazards: Too dangerous to health to expose fire fighters; a few whiffs of vapor could cause death; vapor or liquid could be fatal on penetrating normal protective clothing. Vapor forms explosive mixture with air (*NFPA 1978). On contact with sulfuric acid, it may explode (*Sax 1979).

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

ACETONE CYANOHYDRIN

SECTION V (continued)

Conditions to Avoid: Vapor forms explosive mixtures with air (*NFPA 1978)

Incompatibility (Materials to Avoid): May react violently with water (*NFPA 1978). Contact with sulfuric acid may cause it to explode (*Sax 1979).

Hazardous Decomposition or Byproducts: Decomposes when heated to 248°F or at lower temperature under alkaline conditions, emitting highly toxic hydrogen cyanide (*NFPA 1978).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacture of insecticides (*Hawley 1977) and as a chemical intermediate (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55). Prevent any inhalation of vapor or skin contact (*Patty 1963).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Nausea, loss of consciousness, convulsions (*Clayton and Clayton 1982); irregular heart beat, headache, vomiting (*Patty 1963). Slightly irritating to the skin (*Merck 1976).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration (avoid mouth to mouth resuscitation). 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

ACETONE CYANOHYDRIN

SECTION IX (continued)

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. Avoid contact with contaminated skin (DOT 1984, Guide 55; *Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRICHLOROACETYL CHLORIDE

CAS Registry Number: 76-02-8

Synonyms: (NIOSH/RTECS 1985 Synonyms On-Line File) Acetyl Chloride, Trichloro-; Trichloroacetic Acid Chloride; Trichloroacetochloride

Chemical Formula: CCl_3COCl

Molecular Weight: 181.83

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LC_{50} inhalation (mouse) 0.445 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 244°F, 118°C (Hawley 1981, p. 1040)

Specific Gravity (H_2O=1): 1.654 at 0°C/4°C (Hawley 1981, p. 1040)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (Weast 1979, p. C-98)

Appearance and Odor: Liquid (Hawley 1981, p. 1040)

TRICHLOROACETYL CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 1040)
Skin: Yes (Hawley 1981, p. 1040)
Ingestion: Yes (Hawley 1981, p. 1040)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic by ingestion and inhalation; strong irritant to skin and tissues (Hawley 1981, p. 1040).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Material may react violently with water. Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 59).

Special Fire Fighting Procedures: Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 59).

Unusual Fire and Explosion Hazards: Material may burn but does not ignite readily. Poisonous if inhaled or swallowed; skin contact poisonous. Contact may cause burns to skin and eyes (DOT 1984, Guide 59).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

TRICHLOROACETYL CHLORIDE

SECTION V (continued)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 59).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Contact may cause burns to skin and eyes (DOT 1984, Guide 59).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 59).

TRICHLOROACETYL CHLORIDE

COMMENTS

Sources searched but no information found:

NIOSH/RTECS 1983
ACGIH 1983
NIOSH/OSHA 1978
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HEXACHLOROCYCLOPENTADIENE

CAS Registry Number: 77-47-4

Synonyms: 1,3-Cyclopentadiene, 1,2,3,4,5,5-Hexachloro-; C 56; Graphlox; HCCPD; Hexachlorocyclopentadien; Hexachloropentadiene; HRS 1655; NCI-C55607; PCL; Perchlorocyclopentadiene

Chemical Formula: C_5Cl_6

Molecular Weight: 272.77

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LC_{50} inhalation (rat) 0.018 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds) (statutory); 100 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 462°F, 239°C at 753 mmHg (*Weast 1984)

Specific Gravity (H_2O=1): 1.7019 at 25°C/4°C (*Weast 1984)

Vapor Pressure (mmHg): 0.080 at 25°C (*Clayton and Clayton 1981-82)

Melting Point: 16°F, -9°C (*Weast 1984)

Vapor Density (AIR=1): 9.4 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 800 ppb (*Clayton and Clayton 1981-82)

Appearance and Odor: Yellow-green liquid (*Weast 1984) with a pungent odor (*Hawley 1981)

HEXACHLOROCYCLOPENTADIENE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 mg/m^3 (0.01 ppm) (ACGIH 1986-87, p.20)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Hawley 1981)
Skin: Yes (*Hawley 1981)
Ingestion: Yes (*Hawley 1981)

Health Hazards (Acute, Delayed, and Chronic): This compound is very toxic and may be fatal if inhaled, swallowed, or absorbed through the skin. The probable human lethal dose is 50-500 mg/kg, or between 1 teaspoon and 1 ounce for a 150 lb. (70 kg) person. Severe exposure induces pulmonary hyperemia and edema, degenerative and necrotic changes in brain, heart and adrenal glands and necrosis of liver and kidney tubules (*DOT 1984; Gosselin 1984, p. II-169).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Non-flammable (*Hawley 1981)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use dry chemical, carbon dioxide, water spray or foam for small fires. For large fires, use water spray, fog, or foam. Move hexachlorocyclopentadiene from fire area if this can be done without risk (*DOT 1984).

Special Fire Fighting Procedures: Isolate hazard area and deny entry. Wear positive pressure breathing apparatus and special protective clothing. Fight fire from maximum distance. Dike fire control water for later disposal (*DOT 1984).

Unusual Fire and Explosion Hazards: Toxic hydrogen chloride, chlorine, and phosgene gases may form in fires. In presence of moisture, will corrode iron and other materials; flammable and explosive hydrogen gas may collect in enclosed space (Weiss 1980, p. 498).

NFPA Flammability Rating: Not Found

HEXACHLOROCYCLOPENTADIENE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Reacts slowly with water to form hydrochloric acid; however, the reaction is not hazardous (Weiss 1980, p. 498).

Incompatibility (Materials to Avoid): Will corrode iron and other metals in the presence of moisture (Weiss 1980, p. 498).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 498)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Major uses of hexachlorocyclopentadiene include applications as a chemical intermediate for insecticides and flame retardants (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Do not touch spilled material; stop leak if this can be done without risk. Use water spray to reduce vapors. Absorb small spills with sand or other noncombustible absorbent material and place into containers for later disposal. Dike far ahead of large spills for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Nitrile	POOR/LIMITED
Viton	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

HEXACHLOROCYCLOPENTADIENE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inhalation of mist is highly irritating to mucous membranes, causing tearing, sneezing, and salivation. Eye contact may result in severe irritation. Contact of liquid with the skin may cause blistering and burning (*CHRIS 1978). Headaches and throat irritation have also been reported as a result of exposure to this compound (Clayton and Clayton 1981, p. 3751).

Emergency and First Aid Procedures: Move victim to fresh air and call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with the material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material from the skin is of extreme importance. Keep victim quiet and maintain normal body temperature. Since effects may be delayed, keep victim under observation (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETHYL SULFATE

CAS Registry Number: 77-78-1

Synonyms: Dimethyl Monosulfate; Dimethyl Sulphate; DMS; DMS (Methyl Sulfate); Methyl Sulfate; Sulfuric Acid, Dimethyl Ester; Dimethylsulfate

Chemical Formula: $C_2H_6O_4S$

Molecular Weight: 126.14

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LC_{50} inhalation (mouse) 0.28 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory); 100 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: About 370°F, 188°C (with decomposition) (*Merck 1983)

Specific Gravity (H_2O=1): 1.3283 at 20°C (*Weast 1979)

Vapor Pressure (mmHg): 0.1 at room temperature (*IARC 1972-1985); 0.5 at 20°C (NIOSH/OSHA 1978, p. 90)

Melting Point: -25.15°F, -31.75°C (*Weast 1979)

Vapor Density (AIR=1): 4.35 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 2.8 g/100 mL at 18°C (*Merck 1983)

Appearance and Odor: It is a colorless oily liquid (*Merck 1983) with a faint, onion-like odor (*NFPA 1978)

DIMETHYL SULFATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 mg/m^3 (1 ppm) (NIOSH 1987, p. 110)

ACGIH TLV: TWA 0.5 mg/m^3 (0.1 ppm) (skin) (ACGIH 1985, p. 17)

IDLH: 10 ppm (NIOSH/OSHA 1978, p. 90)

Other Limits Recommended: Industrial substance suspect of carcinogenic potential for man (ACGIH 1985, p. 42).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Acute: extremely toxic vapors and liquid -- a few whiffs or contact on skin could be fatal (*NFPA 1978). Also acutely toxic if ingested. Delayed effects which are ultimately fatal may also occur (*Merck 1983). Lethal concentrations as low as 97 ppm/10 min have been reported in humans. DNA inhibition and damage to human somatic cells, and sister chromatid exchange in human fibroblast cells were observed (*NIOSH/RTECS 1985). Delayed appearance of symptoms may permit unnoticed exposure to lethal quantities (Merck 1983, p. 475).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 182°F (CC) (*Hawley 1977)
Flammable Limits: Moderate fire potential when exposed to heat or flame (*Sax 1975)

LEL: Not Found
UEL: Not Found

Extinguishing Methods: To extinguish small fires use water, foam, carbon dioxide, and dry chemicals (*Sax 1975). For large fires use water spray, fog, or foam. Move container from fire area if you can do it without risk. Cool containers exposed to flames with water. Fight fire from a maximum distance (DOT 1984, Guide 57).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special protective clothing. Dike fire control water for later disposal. Do not scatter material (DOT 1984, Guide 57).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: 2

DIMETHYL SULFATE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*IARC 1972-1985)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Material is normally stable even under fire exposure conditions and is not hazardously reactive with water (*NFPA 1978). It is incompatible with strong oxidizers and strong ammonia solutions (NIOSH/OSHA 1978, p. 90).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a chemical intermediate for quaternary ammonium salts and for alkylation of phenols and thiols (*SRI), and as a methylating agent in the manufacture of many organic chemicals (*Merck 1983). Formerly, dimethyl sulfate was used as a war gas. It is also used in the manufacture of dyes, perfumes, for the separation of mineral oils, and for the analysis of auto fluids (*Browning 1965).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

If spilled in a building, the building must be evacuated and the agent decomposed by hosing with water or spraying with 5 percent sodium hydroxide (caustic soda) (*Dreisbach 1977). For large spills, evaporating vapors can be collected in a chamber with a gas cleaning device (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Immediate effects of vapor exposure are eye irritation, cough, swelling of tongue, lips, and larynx, and lungs

DIMETHYL SULFATE

SECTION IX (continued)

(later). Ingestion or direct contact with mucous membranes causes corrosion. Once absorbed, lung damage and liver and kidney injury will occur (*Dreisbach 1977). Liquid dermal exposure causes blistering, followed by convulsions, delirium, coma, and death in severe cases (*Merck 1983).

Emergency and First Aid Procedures: Move victim to fresh air and call emergency medical care. If not breathing, start artificial respiration; if breathing is difficult, give oxygen. If dermal contact occurs, immediately flush with water for 15 minutes. It is very important to quickly remove material from skin. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Since effects may be delayed, keep a close watch on the victim (DOT 1984, Guide 57).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TABUN

CAS Registry Number: 77-81-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 127) Phosphoramidocyanidic Acid, Dimethyl-, Ethyl Ester; Dimethylamidoethoxyphosphoryl Cyanide; Dimethylphosphoramidocyanidic Acid, Ethyl Ester; Ethyl Dimethylamidocyanophosphate; Ethyl N,N-Dimethylphosphoramidocyanidate; Ethyl N,N-Dimethylamino Cyanophosphate; GA; LE-100; MCE; T-2104; TL 1578

Chemical Formula: $C_5H_{11}N_2O_2P$

Molecular Weight: 162.15

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LD_{50} skin (mouse) 1 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds) (statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 464°F, 240°C (Merck 1983, p. 1297)

Specific Gravity (H_2O=1): 1.073 (U.S. Army 1975, p. 3-2)

Vapor Pressure (mmHg): 0.07 at 25°C (U.S. Army 1975, p. 3-2)

Melting Point: -58°F, -50°C (Merck 1983, p. 1297)

Vapor Density (AIR=1): 5.63 (U.S. Army 1975, p. 3-2)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (Merck 1976, p. 1297).

TABUN

SECTION II (continued)

Appearance and Odor: Colorless to brown liquid; faint fruity odor (U.S. Army 1975, p.3-2)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (U.S. Army 1975, p. 3-2)
Skin: Yes (U.S. Army 1975, p. 3-2)
Ingestion: Yes (U.S. Army 1975, p. 3-2)

Health Hazards (Acute, Delayed, and Chronic): This material is toxic by inhalation and by absorption through skin and eyes. The lethal dose for humans may be as low as 0.01 mg/kg (Merck 1983, p. 1297). Tabun is a nerve agent; it acts as a cholinesterase inhibitor. The median lethal dosage (respiratory) is 400 mg-minute/m^3 for humans; the median incapacitating dosage is 300 mg-minute/m^3. Respiratory lethal dosages kill in 1 to 10 minutes; liquid in the eye kills nearly as rapidly. Skin absorption great enough to cause death may occur in 1 to 2 minutes, but may be delayed for 1 to 2 hours (U.S. Army 1975, p. 3-3).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 172°F (Sax 1984, p. 1335)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poison A, Liquid) Extinguish with alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 56)

Special Fire Fighting Procedures: Complete protection required; have available decontaminants (bleach, alkali) and atropine (U.S. Army 1975, p. 3-2). Bleaching powder (chlorinated line) destroys Tabun but gives rise to cyanogen chloride (Merck 1983, p. 1297).

Unusual Fire and Explosion Hazards: Extremely poisonous (Merck 1983, p. 1297). (Non-Specific -- Poison A, Liquid) Keep away from sparks, flames, and sources of ignition. Keep out of water sources and sewers (Student 1981, p. 56).

NFPA Flammability Rating: Not Found

TABUN

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (U.S. Army 1975, p. 3-3)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Avoid water and acids (U.S. Army 1975, p. 3-2). Can react with oxidizing materials (Sax 1984, p. 1335).

Hazardous Decomposition or Byproducts: Hydrolysis forms hydrogen cyanide (U.S. Army 1975, p. 3-2). When heated to decomposition, it emits very toxic fumes of oxides of phosphorus and nitrogen (Sax 1984, p. 1335).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is a chemical warfare agent (Merck 1983, p. 1297).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poison A, Liquid) When handling, avoid breathing vapors, keep upwind, avoid bodily contact with the material, and upon skin contact wash with soap and water (Student 1981, p. 56). Speed in removing material from skin is of extreme importance. Remove and isolate contaminated clothing and shoes (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

TABUN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Nerve agent symptoms include difficulty in breathing, drooling, nausea, vomiting, cramps, involuntary defecation and urination, twitching, jerking, staggering, headache, confusion, drowsiness, coma, and convulsion. Inhalation causes dimness of vision and pinpointing of the pupils (U.S. Army 1975, p. 3-2).

Emergency and First Aid Procedures: The toxic effects of tabun are similar to parathion (Sax 1984, p. 1335). First aid for parathion is as follows: move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TETRAETHYLLEAD

CAS Registry Number: 78-00-2

Synonyms: Lead, Tetraethyl-; NCI-C54988; Plumbane, Tetraethyl-; TEL; Tetraethyl Lead, Liquid; Tetraethyl Lead; Tetraethylplumbane

Chemical Formula: $C_8H_{20}Pb$

Molecular Weight: 323.45

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LD_{50} oral (rat) 12.3 mg/kg

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): In Lead Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: About 392°F, 200°C (*Merck 1983); decomposes between 110 and 200°C (Verschueren 1983, p. 1085)

Specific Gravity (H_2O=1): 1.653 at 20°C (*Merck 1983)

Vapor Pressure (mmHg): 0.2 at 20°C (*IARC 1972-1985)

Melting Point: -202°F, -130°C (*IARC 1972-1985)

Vapor Density (AIR=1): 8.6 (NFPA 1984, p. 325M-86)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*IARC 1972-1985)

Appearance and Odor: Colorless liquid with a pleasant odor (Hawley 1981, p. 1006)

TETRAETHYLLEAD

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.075 mg (lead)/m^3 (NIOSH 1987, p.220)

ACGIH TLV: 0.100 mg (lead)/m^3 (skin) (ACGIH 1986-87, p.30)

IDLH: 40 mg (lead)/m^3 (NIOSH 1987, p. 220)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Venugopal 1978)
Skin: Yes (*Venugopal 1978)
Ingestion: Yes (*Venugopal 1978)

Health Hazards (Acute, Delayed, and Chronic): Extremely poisonous; may be fatal if inhaled, swallowed, or absorbed from the skin. Contact may cause burns to skin and eyes (*DOT 1984). Most symptoms of poisoning are due to the effects of tetraethyllead on the nervous system (*Gilman 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 200°F (no method given) (NFPA 1984, p. 325M-86)
Flammable Limits:

LEL: 1.8 percent by volume (NFPA 1984, p. 325M-86)
UEL: Not Found

Extinguishing Methods: Water spray may be used because the material can be cooled below its flash point (*NFPA 1978).

Special Fire Fighting Procedures: Fire fighting should be done from an explosive-resistant location. Use water from unmanned monitors and hose-holders to keep fire-exposed containers cool. When stopping leak, use water spray to protect firefighters (*NFPA 1978). Runoff from fire control or dilution water may cause pollution (*DOT 1984).

Unusual Fire and Explosion Hazards: May explode in fires (*CHRIS 1978).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*IARC 1972-1985)
Stable:

Conditions to Avoid: Decomposes slowly at room temperature and more rapidly at elevated temperatures (*IARC 1972-1985).

Incompatibility (Materials to Avoid): Not Found

TETRAETHYLLEAD

SECTION V (continued)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Virtually all of the tetraethyllead produced in the USA is used as an antiknock additive for gasolines (*IARC 1972-1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Tetraethyllead is hazardous, but areas may be entered with extreme care. No skin surface should be exposed. Use water spray to disperse vapors (*NFPA 1978). Outdoors, stay upwind and keep out of low areas. Isolate hazard area (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TETRAETHYLLEAD

(78-00-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless, oily liquid.

Odor - Pleasant, sweet odor.

Commercial Form - 98% pure liquid dyed red or other distinctive color.

Uses - Aviation gasoline, antiknock agent, ethylating agent.

Materials to Avoid - Oxidizers.

Caution: *Flammable liquid. When burned, toxic fumes of lead oxide will be emitted. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Lead tetraethyl, tetraethylplumbane, TEL.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbitol, mannitol, dexamethasone.

Signs and Symptoms of Acute Tetraethyllead Exposure:

Warning: *Effects may be delayed for hours to days. Caution is advised.*

Signs and symptoms of acute exposure to tetraethyllead may be severe and include anxiety, irritability, insomnia, violent/frightening dreams, headache, disorientation, hyperexcitability, delusions, and hallucinations. Muscular weakness, ataxia, tremors, convulsions, cerebral edema, and coma may occur. A metallic taste may be noted. Sneezing, bronchitis, and pneumonia may be observed. Bradycardia (slow heart rate), hypotension (low blood pressure), hypothermia, and pallor may also occur. Gastrointestinal symptoms include vomiting and diarrhea. Tetraethyllead may irritate moist skin, eyes, and mucous membranes.

TETRAETHYLLEAD

Emergency Life-Support Procedures:

Acute exposure to tetraethyllead may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to tetraethyllead.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to tetraethyllead.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

TETRAETHYLLEAD

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIOXATHION

CAS Registry Number: 78-34-2

Synonyms: 1,4-Dioxan-2,3-diyl Bis(O,O-Diethyl Phosphorothiolothionate); 1,4-Dioxan-2,3-Diyl O,O,O',O'-Tetraethyl Di(Phosphorodithioate); 1,4-Dioxane-2,3-S,S'-Bis(O,O-Diethyl Dithiophosphate); 2,3-Bis(Diethoxyphosphinothioylthio)-1,4-Dioxane; 2,3-Dioxane S,S-Bis(O,O-Diethylphosphorodithioate); 2,3-Dioxanedithiol S,S-Bis(O,O-Diethyl Phosphorodithioate); AC 528; Bercotox; Delnatex; Delnav; Dioxation; Dioxothion; ENT 22,897; Hercules 528; Hercules AC528; Kavadel; Navadel; NCI-C00395; p-Dioxane-2,3-Dithiol, S,S-Diester with O,O-Diethyl Phosphorodithioate; p-Dioxane-2,3-diyl Ethyl Phosphorodithioate; Phosphorodithioic Acid, S,S'-1,4-Dioxane-2,3-diyl O,O,O',O'-Tetraethyl Ester; Phosphorodithioic Acid, S,S'-p-Dioxane-2,3-diyl O,O,O',O'-Tetraethyl Ester; Ruphos

Chemical Formula: $C_{12}H_{26}O_6P_2S_4$

Molecular Weight: 456.54

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LC_{50} inhalation (mouse) 0.34 mg/liter/1 hour (*NIOSH/RTECS 1985).

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.257 at 26°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: -4°F, -20°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

DIOXATHION

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (*Merck 1983)

Appearance and Odor: Tan liquid (*Merck 1983). (Technical) Brown liquid (*Martin 1974).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: 0.2 mg/m^3 (skin) (ACGIH 1985, p. 17)

IDLH: Not Found

Other Limits Recommended: ADI 0.0015 mg/kg (*Hayes 1975).

Routes of Entry: **Inhalation:** Yes (*Hawley 1977)
Skin: Yes (Farm Chemicals Handbook 1984, p. C-82)
Ingestion: Yes (*Hawley 1977)

Health Hazards (Acute, Delayed, and Chronic): Very toxic. Probable oral lethal dose for humans is 50-500 mg/kg or between 1 teaspoonful and 1 oz. for a 70 kg (150 lb.) person (*Gosselin 1976). It is a cholinesterase inhibitor (*Hawley 1977). Death is primarily due to respiratory arrest arising from failure of the respiratory center, paralysis of respiratory muscles, intense bronchoconstriction, or all three (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:

LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

DIOXATHION

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Shock can shatter container, releasing contents (*Sax 1975). (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Container may explode in heat of fire. Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*ACGIH 1979)

Conditions to Avoid: Avoid alkali materials and heat. It is unstable to iron or tin surfaces and when mixed with certain carriers (*Martin 1974).

Incompatibility (Materials to Avoid): Avoid alkali materials (*Martin 1974)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of oxides of nitrogen, phosphorus, and sulfur (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Dioxathion is used for control of insects and mites on grapes, citrus, walnuts, ornamentals, apples, pears, and quince. Also used as a spray or dip for the control of ticks, lice, hornfly, and sheep ked on cattle, goats, sheep, and hogs (Farm Chemicals Handbook 1984, p. C-82).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

DIOXATHION

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987) (Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIOXATHION

(78-34-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Tan liquid.

Commercial Forms - Brown emulsifiable concentrate or wettable powder.

Use - Pesticide.

Other Names - Delnatex; Delnav; Deltic; 1,4-dioxan-2,3-diyl bis(O,O-diethyl phosphorothiolothionate); Dioxation; Kavadel; Navadel.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Dioxathion Exposure:

Note: Dioxathion is a cholinesterase inhibitor.

Acute exposure to dioxathion may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) may occur although hypertension (high blood pressure) is not uncommon. Chest pain may be noted. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

DIOXATHION

Emergency Life-Support Procedures:

Acute exposure to dioxathion may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to dioxathion.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to dioxathion.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin area three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

DIOXATHION

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of dioxathion is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of dioxathion may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- AMITON

CAS Registry Number: 78-53-5

Synonyms: (NIOSH/RTECS SYNONYMS 1983, Volume 3, p. 150) Phosphorothioic Acid, S-(2-(Diethylamino)Ethyl) O,O-Diethyl Ester; Chipman 6200; Citram; S-(Diethylaminoethyl) O,O-Diethyl Phosphorothioate; Diethyl S-2-Diethylaminoethyl Phosphorothioate; (2-Diethylamino)Ethylphosphorothioic Acid O,O-Diethyl Ester; O,O-Diethyl S-2-Diethylaminoethyl Phosphorothioate; O,O-Diethyl S-Diethylaminoethyl Phosphorothiolate; O,O-Diethyl S-2-Diethylaminoethyl Phosphorothiolate; O,O-Diethyl S-(beta-Diethylamino)Ethyl Phosphorothiolate; O,O-Diethyl S-(2-Diethylaminoethyl) Thiophosphate; DSDP; ENT 24,980-X; Inferno; Metramac; Metramak; R-5,158; Rhodia-6200; Tetram

Chemical Formula: $C_{10}H_{24}NO_3PS$

Molecular Weight: 269.38

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LD_{50} oral (rat) 3.3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 230°F, 110°C at 0.2 mm (Sax 1984, p. 1008)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

AMITON

SECTION II (continued)

Solubility in Water: Not Found

Appearance and Odor: Liquid (Merck 1983, p. 73)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 1009)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1009)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic orally. It is a cholinesterase inhibitor (Sax 1984, p. 1009).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, can emit toxic fumes of oxides of nitrogen, phosphorus, and sulfur (Sax 1984, p. 1009). (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Container may explode in heat of fire. Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 55).

AMITON

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Extreme heat (Sax 1984, p. 1009)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Very toxic nitrogen oxides, phosphorus oxides, and sulfur oxides when heated to decomposition (Sax 1984, p. 1009).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an acaricide and insecticide (Farm Chemicals Handbook 1984, p. C222).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

AMITON

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987) (Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: The toxic effects are similar to parathion (Sax 1984, p. 1009). Symptoms of parathion poisoning include anorexia, nausea, vomiting, diarrhea, excessive salivation, pupillary constriction, bronchoconstriction, muscle twitching, convulsions, coma, respiratory failure. Effects are cumulative (Sax 1984, p. 2119).

Emergency and First Aid Procedures: Effects are similar to those of parathion (Sax 1984, p. 1009). First aid procedures for parathion are as follows: move victim to fresh air; call emergency medical care. If not breathing, perform 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- OXETANE, 3,3-BIS(CHLOROMETHYL)-

CAS Registry Number: 78-71-7

Synonyms: (NIOSH/RTECS 1985 Synonyms On-Line File) 3,3-Bis (Chloromethyl)Oxetane; Penton; 3,3-bis(Chloromethyl)-1-Oxacyclobutane

Chemical Formula: $C_5H_8Cl_2O$

Molecular Weight: 155

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LC_{50} inhalation (mouse) 0.2 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 217°F, 103°C at 30 mmHg (Beilstein 1974, Volume 17/1, p. 68)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 66°F, 19°C (Beilstein 1974, Volume 17/1, p. 68)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

OXETANE, 3,3-BIS(CHLOROMETHYL)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

OXETANE, 3,3-BIS(CHLOROMETHYL)

SECTION VI -- USE INFORMATION

Penton is the trademark for a thermoplastic resin derived from 3,3-bis(chloromethyl)oxetane. Penton is a linear polymer used for solid and lined valves, pumps, pipe and fittings, and a monofilament for filter supports and column packing (Hawley 1981, p. 785).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS:

Sources searched but no information found:

Weast 1979
Merck 1983
Sax 1984
DOT 1984
NFPA 1984
Student 1981
Weiss 1980
Doull 1980
Clayton and Clayton 1981-82
Encyc Occupat Health and Safety 1983
CHRIS 1978
Hayes 1982

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOBUTYRONITRILE

CAS Registry Number: 78-82-0

Synonyms: 2-Methylpropanenitrile; 1-Cyano-1-Methylethane; 2-Cyanopropane; 2-Methylpropane Nitrile; 2-Methylpropionitrile; Dimethylacetonitrile; Isopropyl Cyanide; Isopropyl Nitrile; Isopropylcyanide; Propanenitrile, 2-Methyl-; Propanoic Acid, 2-Methyl-, Nitrile

Chemical Formula: C_4H_7N

Molecular Weight: 69.1

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LD_{50} oral (mouse) 25 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds) (statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 219°F, 103.8°C (*Weast 1979)

Specific Gravity (H_2O=1): 0.7608 at 30°C/4°C (*Weast 1979); 0.733 at 20°C (*Hawley 1977)

Vapor Pressure (mmHg): Not Found

Melting Point: -96.7°F, -71.5°C (*Weast 1979)

Vapor Density (AIR=1): 2.38 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly (*Weast 1979)

Appearance and Odor: Colorless liquid (*Hawley 1977)

ISOBUTYRONITRILE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Occupational exposure to nitriles -- recommended standard in air: TWA 22 mg/m^3 (*NIOSH/RTECS 1985).

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 577)
Skin: Yes (Hawley 1981, p. 577)
Ingestion: Yes (Hawley 1981, p. 577)

Health Hazards (Acute, Delayed, and Chronic): Poisonous; may be fatal if inhaled, swallowed, or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 28). (Non-Specific -- Nitriles) Primarily, they are skin and eye irritants. Large doses cause collapse and stop breathing (Clayton and Clayton 1981-82, p. 4846).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 47°F, 8°C (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, foam, or fog (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. Move container from fire area if you can do so without risk. Dike fire control water for later disposal; do not scatter the material. Spray cooling water on containers that are exposed to flames until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Vapor may explode if ignited in an enclosed area (Weiss 1980, p. 531). Toxic oxides of nitrogen are produced during combustion (Student 1981, p. 297). It is a flammable/combustible material and 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 and poison hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 28).

NFPA Flammability Rating: 3

ISOBUTYRONITRILE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 531)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of oxides of nitrogen (Sax 1984, p. 1639).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 531)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used in organic synthesis (*Patty 1963); as an intermediate for insecticides (Hawley 1981, p. 577); and as a gasoline additive (Clayton and Clayton 1981-82, p. 4873).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to control flow as necessary. Attempt to stop leak if this can be done without hazard. Use water spray to disperse vapors and dilute standing pools of liquid. Avoid breathing vapors. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student, 1981, p. 297). Wear positive pressure breathing apparatus and special protective clothing. Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

ISOBUTYRONITRILE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ISOBUTYRONITRILE

(78-82-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Isobutyronitrile toxicity can occur via ingestion, dermal/eye contact, or inhalation; death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility!*

Substance Characteristics:

Pure Form - Colorless liquid.

Commercial Form - Liquid in tank cars.

Uses - Chemical intermediate, pesticide intermediate, gasoline additive.

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire. Isobutyronitrile will liberate toxic nitrogen oxide fumes when heated to decomposition.*

Other Names - 1-Cyano-1-methylethane, isopropyl cyanide, isopropyl nitrile, 2-methylpropane nitrile.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), sodium bicarbonate, diazepam, phenytoin.

Signs and Symptoms of Acute Isobutyronitrile Exposure:

Warning: *Heart palpitation may occur within minutes after exposure. High doses can stop breathing. Vital signs should be monitored closely. Caution is advised.*

ISOBUTYRONITRILE

Signs and symptoms of acute exposure to isobutyronitrile may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cherry-red (and potentially bloody) mucous membranes, cardiac arrhythmias, and other cardiac abnormalities are common. Cyanosis (blue tint to skin and mucous membranes) may also be found.

Tachypnea (rapid respiratory rate) may be followed by respiratory depression. Lung hemorrhage and pulmonary edema may occur. Headache, vertigo (dizziness), agitation, giddiness, salivation, nausea, and vomiting may be followed by combative behavior, convulsions, and coma.

Isobutyronitrile is irritating to the skin and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common.

Emergency Life-Support Procedures:

Acute exposure to isobutyronitrile may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to isobutyronitrile.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with isobutyronitrile-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to isobutyronitrile.

ISOBUTYRONITRILE

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with isobutyronitrile-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Remove contaminated clothing as soon as possible.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with isobutyronitrile-contaminated persons or their gastric contents may result in self-poisoning.*

2. RUSH to a health care facility!

3. DO NOT induce vomiting or attempt to neutralize!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL VINYL KETONE

CAS Registry Number: 78-94-4

Synonyms: 1-Buten-3-one; 2-Butenone; 3-Buten-2-one; 3-Butene-2-one; Acetone, Methylene-; Acetyl Ethylene; Butenone; Delta(3)-2-Butenone; Gamma-Oxo-Alpha-Butylene; Ketone, Methyl Vinyl; Methylene Acetone; Methylvinyl Ketone; Vinyl Methyl Ketone

Chemical Formula: C_4H_6O

Molecular Weight: 70.09

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

LC_{50} inhalation (rat) 0.007 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds) (statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 179°F, 81.4°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.8636 at 20°C/4°C; 0.8407 at 25°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): Not Found

Melting Point: 20°F, -7°C (*CHRIS 1978)

Vapor Density (AIR=1): 2.41 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Merck 1983)

METHYL VINYL KETONE

SECTION II (continued)

Appearance and Odor: Colorless liquid (*Hawley 1981) with pungent odor (*Merck 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Similar to other ketones) (*Rumack 1975 to Present)
Skin: Yes (*Merck 1983)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is readily absorbed through the skin, causing general poisoning (*Merck 1983) similar to other ketones; inhalation has central nervous system depressant effects (*Rumack 1975 to Present). It is irritating to mucous membranes and respiratory tract (*Merck 1983) and to the skin; it is a lachrymator and can cause eye injury (*Grant 1974).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 20°F, -6.6°C (CC) (*Hawley 1981); 30°F, -1.1°C (OC) (*CHRIS 1978)

Flammable Limits:
LEL: 2.1% (*NFPA 1978)
UEL: 15.6% (*NFPA 1978)

Extinguishing Methods: Use dry chemical, alcohol foam, or carbon dioxide. Water spray may be ineffective as an extinguishing agent (*NFPA 1978). Small fires: dry chemical, carbon dioxide, and foam. Large fires: fog or foam. Move container from fire area if you can do so without risk. Dike fire control water for later disposal; do not scatter the material. Spray cooling water on containers that are exposed to flames until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Use water to keep fire-exposed containers cool (*NFPA 1978). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Isolate for

METHYL VINYL KETONE

SECTION IV (continued)

1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Vapors form flammable mixtures with air, and may travel a considerable distance to a source of ignition and flash back. Polymerization may take place in containers, possibly with violent rupture of containers (*NFPA 1978). Upon exposure to heat or flame, it emits toxic and irritating fumes (*Sax 1979). Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors, or in sewers (DOT 1984, Guide 28).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Polymerizes on standing (*Merck 1983)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Yes (*NFPA 1978)
May Not Occur:

Conditions to Avoid: Heat or sunlight (*NFPA 1978)

SECTION VI -- USE INFORMATION

This material is used as an alkylating agent, a starting material for plastics, and an intermediate in the synthesis of steroids and Vitamin A (*Merck 1983).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Isolate area. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Absorb small spills with sand or other noncombustible absorbent material and place into containers for later disposal. For large spills, dike far ahead for later disposal (*DOT 1984).

METHYL VINYL KETONE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987) (Chemical Resistance/Amount of Data)

CPE	POOR/LIMITED**
Neoprene	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	POOR/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Liquid or high concentration of vapors causes blistering of the skin (*NFPA 1978). Similar to other ketones; can cause sore throat, sneezing, coughing, and salivation. Inhalation may cause nausea and vomiting; inhalation of high concentrations can cause headache, dizziness, fainting, tremor, uncoordination, lowered body temperature, depressed respiratory and heart rate, gasping, coma, and death. Direct aspiration of liquid into lungs can cause chemical pneumonia. (*Rumack 1975 to Present)

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- LACTONITRILE

CAS Registry Number: 78-97-7

Synonyms: 2-Hydroxypropanenitrile; 2-Hydroxypropionitrile; Acetaldehyde Cyanohydrin; Acetocyanohydrin; alpha-Hydroxypropionitrile; Ethylidene Cyanohydrin; Propanenitrile, 2-Hydroxy-; Propanoic Acid, 2-Hydroxy-, Nitrile

Chemical Formula: C_3H_5NO

Molecular Weight: 71

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (rabbit) 20 mg/kg

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 360-363°F, 182-184°C; slight decomposition (Weast 1979, p. C-456)

Specific Gravity (H_2O=1): 0.9877 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): 10 at 74°C (*Patty 1963)

Melting Point: -40°F, -40°C (*Weast 1979)

Vapor Density (AIR=1): 2.45 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in all proportions (*Weast 1979)

Appearance and Odor: Straw colored liquid (*Patty 1963)

LACTONITRILE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Encyc Occupat Health and Safety 1971)
Skin: Yes (*Encyc Occupat Health and Safety 1971)
Ingestion: Yes (*Encyc Occupat Health and Safety 1971)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic by oral, skin, or eye contact (*Patty 1963)

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 170°F (TCC) (Sax 1984, p. 1683)
Flammable Limits: Moderate when exposed to heat or flame (*Encyc Occupat Health and Safety 1971)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Foam, carbon dioxide, dry chemical (Sax 1984, p. 1683).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Cyanide fumes released when heated to decomposition (*Encyc Occupat Health and Safety 1971).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Alkali (*Hawley 1977); oxidizing material (Sax 1984, p. 1683).

Hazardous Decomposition or Byproducts: Cyanide fumes when heated to decomposition (*Encyc Occupat Health and Safety 1971); hydrocyanic acid in presence of alkali (*Hawley 1977).

LACTONITRILE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Solvent -- intermediate in production of ethyl lactate and lactic acid (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe vapors or touch spilled material (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for LACTONITRILE

(78-97-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Lactonitrile toxicity can occur via ingestion, dermal/eye contact, or ingestion; death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and rush victims to a health care facility.*

Substance Characteristics:

Pure Form - Straw-colored liquid.

Commercial Form - 95 to 97% pure liquid in carboys.

Uses - Chemical intermediate, solvent.

Materials to Avoid - Alkali, oxidizers.

Caution: *Toxic hydrogen cyanide gas may be released upon contact with alkali or when heated to decomposition.*

Other Names - Acetaldehyde cyanohydrin, ethylidene cyanohydrin, 2-hydroxypropanenitrile, 2-hydroxypropionitrile.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), sodium bicarbonate, diazepam, phenytoin.

Signs and Symptoms of Acute Lactonitrile Exposure:

Warning: *Heart palpitations may occur within minutes after exposure. Caution is advised. Vital signs should be monitored closely. Symptoms may be delayed.*

Signs and symptoms of acute exposure to lactonitrile may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cherry-red mucous membranes and blood, cardiac arrhythmias, and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous

LACTONITRILE

membranes) may be present following exposure to lactonitrile. Salivation, nausea, and vomiting may also occur.

Tachypnea (rapid respiratory rate) may be followed by respiratory depression. Lung hemorrhage and pulmonary edema may occur. Headache, vertigo (dizziness), agitation, and giddiness may be followed by combative behavior, convulsions, paralysis, protruding eyeballs, dilated and unreactive pupils, and coma.

Lactonitrile is irritating to the skin and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common.

Emergency Life-Support Procedures:

Acute exposure to lactonitrile may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to lactonitrile.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with lactonitrile-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to lactonitrile.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

LACTONITRILE

Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with lactonitrile-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with lactonitrile-contaminated persons or their gastric contents may result in self-poisoning.*

2. RUSH to a health care facility!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. DO NOT induce vomiting. Ipecac is not recommended for ingestion of lactonitrile.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ACRYLAMIDE

CAS Registry Number: 79-06-1

Synonyms: 2-Propenamide; Acrylic Amide; Ethylene Carboxamide; Propenamide; Propenoic Acid, Amide

Chemical Formula: C_3H_5NO

Molecular Weight: 71.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000/10,000 (pounds)

RQ: 5000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 189°F, 87°C at 2 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.122 at 30°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 0.007 at 20°C (*ACGIH 1980)

Melting Point: 184°F, 84.5°C (*Merck 1976)

Vapor Density (AIR=1): 2.45 (*Sax 1975)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 215.5 g/100 mL water at 30°C (*Merck 1976)

Appearance and Odor: Odorless (*Grant 1974) white, crystalline solid (*Sax 1975).

ACRYLAMIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Air: TWA 0.3 mg/m^3 (skin) (OSHA 1984, p. 660)

ACGIH TLV: TWA 0.3 mg/m^3; STEL 0.6 mg/m^3 (skin) (*ACGIH 1981)

IDLH: Not Found

Other Limits Recommended: NIOSH: 0.3 mg/m^3 10 hr TWA (NIOSH 1987, p.46). It is recommended that no more than 0.05 mg/kg/day be absorbed by workers (*ACGIH 1980). Suspected of carcinogenic potential in humans; notice of intent to change to 0.03 mg/m^3 for 1985-86 (ACGIH 1985, p. 42).

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 43)
Skin: Yes (*Hamilton 1974)
Ingestion: Yes (NIOSH/OSHA 1978, p. 43)

Health Hazards (Acute, Delayed, and Chronic): Classified as very toxic; probable oral lethal human dose is between 50 and 500 mg/kg or between 1 teaspoon and 1 ounce for a 150 lb. person (Gosselin 1984, p. II-409). Polymerized acrylamide is not toxic, but the monomer can cause peripheral nerve damage (*Doull 1980). It is a cumulative neurotoxin and repeated exposure to small amounts may cause serious injury to the nervous system (*Rumack 1975 to Present). The neurological effects may be delayed. Polymer inhibitors or stabilizers added to the monomer may also produce toxicity (*Peer Review Committee). The symptoms of acrylamide toxicity are consistent with mid-brain lesions (*Hamilton 1974) and blocked transport along both motor and sensory axons (*Doull 1980).

Medical Conditions Generally Aggravated by Exposure: Individuals with nervous system diseases should not be exposed to acrylamide (*Plunkett 1976).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 138°C (CC) (*Sunshine 1969)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray or foam. For large fires use water spray, fog or foam. Move container from fire area if you can do so without risk (*DOT 1984).

Special Fire Fighting Procedures: Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (*DOT 1984).

Unusual Fire and Explosion Hazards: Heating to decomposition evolves ammonia, hydrogen and carbon monoxide (*Rumack 1975 to Present).

NFPA Flammability Rating: Not Found

ACRYLAMIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Hawley 1977)

Conditions to Avoid: Heat (*ACGIH 1980); ultraviolet light (*Merck 1976).

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1978, p. 42).

Hazardous Decomposition or Byproducts: Pure acrylamide will decompose at 175-300°C giving ammonia, hydrogen and carbon monoxide (*Rumack 1975 to Present).

Hazardous Polymerization: **May Occur:** Yes (*ACGIH 1980)
May Not Occur:

Conditions to Avoid: It readily polymerizes when heated to the melting point or when exposed to ultraviolet light (*Merck 1976). It is known to polymerize with violence when heated (*ACGIH 1980).

SECTION VI -- USE INFORMATION

Reactive monomer and intermediate in production of organic chemicals, polymers or copolymers (*ACGIH 1980); the latter are used as or in flocculants for sewage and waste treatment; soil conditioning agents; ore processing; adhesives; paper and textile industries; permanent press fabrics (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent materal 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

ACRYLAMIDE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	POOR/LIMITED**
Nitrile	POOR/LIMITED**
PE	POOR/LIMITED**
Viton	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ACRYLAMIDE

(79-06-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White crystalline solid.

Odor - None.

Commercial Form - Shipped in fiber drums.

Uses - Manufacture of polymers, dyes, and adhesives; flocculant for sewage and waste treatment; soil conditioning; ore processing.

Caution: *Avoid sources of heat including fire. Acrylamide will polymerize violently when heated.*

Other Names - Acrylic amide, ethylene carboxamide, 2-propenamide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Acrylamide Exposure:

Warning: *Effects may be delayed. Caution is advised.*

Acrylamide is a cumulative neurotoxin. Signs and symptoms of acute exposure may include drowsiness, fatigue, memory loss, confusion, hallucinations, tingling of fingers, loss of vibration and position senses, tremor, muscular weakness, disturbances of balance (especially with the eyes closed), and dysarthria (incoordination of the muscles used for speaking).

Excessive sweating of the feet and hands may also occur. Contact with acrylamide may irritate or burn the skin, eyes, and mucous membranes.

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Emergency Life-Support Procedures:

Acute exposure to acrylamide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to acrylamide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to acrylamide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

ACRYLAMIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROACETIC ACID

CAS Registry Number: 79-11-8

Synonyms: Acetic Acid, Chloro-; alpha-Chloroacetic Acid; Chloracetic Acid; Chloroethanoic Acid; MCA; MKHUK; Monochloracetic Acid; Monochloroacetic Acid; Monochloroacetic Acid Solution; Monochloroethanoic Acid; NCI-C60231

Chemical Formula: $C_2H_3ClO_2$

Molecular Weight: 94.50

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.18 mg/L

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 372°F, 189°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.4043 at 40°C (*Weast 1979)

Vapor Pressure (mmHg): 1 at 43°C (*Patty 1963)

Melting Point: 145°F, 63°C (*Weast 1979)

Vapor Density (AIR=1): 3.26 (*Sax 1975)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble in water (*Weast 1979)

Appearance and Odor: Colorless or white crystals (*Merck 1976).
Colorless to light brown crystals (*Hawley 1977).

CHLOROACETIC ACID

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Encyc Occupat Health and Safety 1971)
Ingestion: Yes (*Encyc Occupat Health and Safety 1971)

Health Hazards (Acute, Delayed, and Chronic): This material is very toxic. The probable lethal oral dose is 50-500 mg/kg of body weight, between one teaspoon and one ounce, for a 150 lb. person. Chloroacetic acid is irritating to the skin, cornea, and respiratory tract and causes burns. It may severely damage skin and mucous membranes. Ingestion may interfere with essential enzyme systems and cause perforation and peritonitis. Burns to skin result in marked fluid and electrolyte loss. Death may follow if more than 3% of the skin is exposed to this material. Other health hazards include central nervous system depression, and respiratory system depression (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Persons with lung diseases are at greater risk (*ITI 1982).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 302°F, 150°C (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Water fog applied gently to surface will cause frothing which will extinguish fire. Normal fire fighting procedures may be used (*NFPA 1978). Extinguish fire using agent suitable for surroundings. Material itself does not burn or burns with difficulty. (*Student 1981) For small fires use dry chemical, carbon dioxide, water spray or foam. For large fires use water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: This material is extremely hazardous to health, but fire fighters may enter areas with extreme care. Full protective clothing including a self-contained breathing apparatus, coat, pants, gloves, boots and bands around legs, arms and waist should be provided. No skin surface should be exposed (*NFPA 1978). Cool fire-exposed containers with water (*Student 1981). Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (*DOT 1984).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits highly toxic fumes of phosgene and chlorides (*Sax 1975). Water may

CHLOROACETIC ACID

SECTION IV (continued)

cause frothing if it gets below surface of the liquid and turns to steam (*NFPA 1978). Flammable/poisonous gases may accumulate in tanks and hopper cars. Some of these materials may ignite combustibles, e.g., wood, paper, oil (*DOT 1984).

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Heating (*Sax 1975)

Incompatibility (Materials to Avoid): It is corrosive to metals (*Student 1981).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of phosgene and chlorides (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chloroacetic acid is used as a pre-emergence herbicide. It is also used as a defoliant (*Martin and Worthing 1974). It is an intermediate for synthetic caffeine (*NIOSH 1984) as well as sarcosine, EDTA, and ethylchloroacetate (*ITI 1982) and sodium carboxymethylcellulose, glycine, thioglycolic acid, pharmaceuticals like Vitamin A and indigoid dyes (*SRI). Additional uses include disinfectant and as a drying agent for curing hay (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Neutralize spilled materials with crushed limestone, soda ash, or lime (*Student 1981). Waste water containing chloroacetic acid can be treated with ammonia, ammonium salts, or amines followed by separation of suspended solids (*Opavsky 1976). Keep unnecessary people away; isolate hazard and deny entry. Stay upwind; keep out of low areas. Notify authorities if water pollution occurs. Do not touch spilled material. Stop leak if you can without risk. Take up small spills with an absorbent, non-combustible material and place into clean, dry containers for later disposal. Dike large spills far ahead of spill for later disposal (*DOT 1984).

CHLOROACETIC ACID

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

PE	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CHLOROACETIC ACID

(79-11-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless, white or light brown crystals.

Odor - Penetrating; similar to vinegar.

Commercial Forms - 99.5% pure liquid or solid in drums.

Uses - Chemical intermediate, herbicide, preservative, disinfectant, drying agent for hay, medicinal treatment of keratoses.

Caution: *Avoid sources of extreme heat including fire. Chloroacetic acid will emit toxic fumes of phosgene and chlorides when heated to decomposition.*

Other Names - Chloroethanoic acid, MCA, monochloroacetic acid.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Chloroacetic Acid Exposure:

Warning: *Effects may be delayed. Caution is advised. Chloroacetic acid is extremely corrosive.*

Signs and symptoms of acute ingestion of chloroacetic acid may be severe and include salivation, intense thirst, difficulty in swallowing, chills, and shock. Oral, esophageal, and stomach burns are common and often associated with severe pain. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of chloroacetic acid.

Acute inhalation exposure may result in sneezing, hoarseness, choking, laryngitis, dyspnea (shortness of breath), respiratory tract irritation, and chest pain. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, pulmonary edema, chronic bronchitis, and pneumonia may also occur.

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If the eyes have come in contact with chloroacetic acid, then irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure may result in dermatitis (red, inflamed skin), severe burns, and pain.

Emergency Life-Support Procedures:

Acute exposure to chloroacetic acid may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to chloroacetic acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to chloroacetic acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

CHLOROACETIC ACID

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Rinse mouth with large amounts of water. Instruct victims not to swallow this water.

3. DO NOT induce vomiting or attempt to neutralize!

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are alert and conscious.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THIOSEMICARBAZIDE

CAS Registry Number: 79-19-6

Synonyms: 1-Amino-2-Thiourea; 1-Aminothiourea; 2-Thiosemicarbazide; Aminothiourea; Hydrazinecarbothioamide; Isothiosemicarbazide; N-Aminothiourea; Thiocarbamoylhydrazine

Chemical Formula: CH_5N_3S

Molecular Weight: 91.15

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 9.16 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 356-363°F, 180-184°C (*Hawley 1977)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Hawley 1977)

Appearance and Odor: This compound is a white crystalline powder and is odorless (*Hawley 1977)

THIOSEMICARBAZIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2575)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by ingestion (Sax 1984, p. 2575). May induce goiter and cause delayed toxic effects in blood and skin (*Rumack 1975 to Present). May be mutagenic in human cells (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous, Solid, n.o.s) Extinguish with any chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous, Solid, n.o.s.) Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, very toxic fumes of sulfur oxides and nitrogen oxides are emitted (Sax 1984, p. 2575).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

THIOSEMICARBAZIDE

SECTION V (continued)

Hazardous Decomposition or Byproducts: When heated to decomposition, thiosemicarbazide emits very toxic fumes of oxides of sulfur and nitrogen (Sax 1984, p. 2575).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This compound is used as a reagent for ketones and certain metals, for photography and as a rodenticide (*Hawley 1977). It is also effective for control of bacterial leaf blight of rice (*Nippon Noyaku Gakkaishi 1976, 1(2)95). Not a registered pesticide in the U.S. (USEPA/Active Ingredients, 1985). It is a chemical intermediate for herbicides and a reagent for detection of metals (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid skin contact, ingestion or inhalation (see Section III above). (Non-Specific -- Poisonous Solid, n.o.s.) Do not touch 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Thiosemicarbazide may induce goiter and has also been reported to cause bone marrow depression with accompanying decreases in white blood cells and platelets. It may also cause skin irritation (*Rumack 1975 to Present).

Emergency and First Aid Procedures: For inhalation, remove victim to fresh air and monitor for breathing difficulty. For eye exposure, irrigate copiously with water for 15 minutes and follow with eye exam if pain persists. For dermal exposure, wash skin twice with water and soap,

THIOSEMICARBAZIDE

SECTION IX (continued)

followed by exam if pain persists (*Rumack 1975 to Present). (Non-Specific -- Poisonous, Solid, n.o.s.) Call emergency medical care. Remove and isolate contaminated clothing and shoes at the site (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PERACETIC ACID

CAS Registry Number: 79-21-0

Synonyms: Peroxyacetic Acid; Acetyl Hydroperoxide; Hydroperoxide, Acetyl; Peracetic Acid Solution (Sax 1984, p. 2148); Ethaneperoxoic Acid (Merck 1983, p. 1028)

Chemical Formula: $C_2H_4O_3$

Molecular Weight: 76.05

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.45 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 221°F, 105°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.226 at 15°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: 32°F, 0.1°C (*Weast 1979); approximately -22°F, -30°C (Hawley 1981, p. 786)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble (*Weast 1979)

Appearance and Odor: Colorless liquid (*NFPA 1978). Strong, pungent acrid odor (*CHRIS 1978, *Merck 1983).

PERACETIC ACID

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*NFPA 1978)
Skin: Yes (Sax 1984, p. 2148)
Ingestion: Yes (*Gosselin 1984)

Health Hazards (Acute, Delayed, and Chronic): This is a very toxic compound. The probable human oral lethal dose is 50-500 mg/kg, or between 1 teaspoon and 1 ounce for a 150 pound person (*Gosselin 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): (Peracetic Acid, 60% Acetic Acid Solution) 105°F, 41°C (no method given) (NFPA 1984, p. 49-72)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Fight fires from an explosion-resistant location. In advanced or massive fires, area should be evacuated (NFPA 1984, p. 49-72). For small fires: use dry chemical, carbon dioxide, water spray, or foam. For large fires: flood area with water (DOT 1984, Guide 51).

Special Fire Fighting Procedures: If fire occurs in the vicinity of this compound, water should be used to keep containers cool. Cleanup and salvage operations should not be attempted until all of the peroxyacetic acid solution has cooled completely (NFPA 1984, p. 49-72). Keep unnecessary people away; wear self-contained breathing apparatus and full protective clothing (DOT 1984, Guide 51).

Unusual Fire and Explosion Hazards: Decomposes violently at 230°F, 110°C (NFPA 1984, p. 325M-78). When heated to decomposition, this compound emits acrid smoke and fumes (Sax 1984, p. 2148). Runoff to sewer may create a fire or explosion hazard (DOT 1984, Guide 51).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (NFPA 1984, p. 49-72)
Stable:

Conditions to Avoid: Shock and heat (NFPA 1984, p. 49-72).

PERACETIC ACID

SECTION V (continued)

Incompatibility (Materials to Avoid): Powerful oxidizer. Isolate from other stored material, particularly accelerators, oxidizers, and organic or flammable materials (NFPA 1984, p. 49-72).

Hazardous Decomposition or Byproducts: Emits acrid smoke and fumes when heated to decomposition (Sax 1984, p. 2148).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (NFPA 1984, p. 49-72)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This compound is used as a bactericide and fungicide, especially in food processing; a reagent in making caprolactam and glycerol; an oxidant for preparing epoxy compounds; a bleaching agent; a sterilizing agent; and a polymerization catalyst for polyester resins (*Hawley 1981; *SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Do not touch the spilled material; shut off all ignition sources and stop the leak if this can be done without risk (DOT 1984, Guide 51). The spilled material should be absorbed with a noncombustible absorbent such as vermiculite. Sweep up and place in a metal container for immediate disposal. Do not use spark-generating metals or organic materials for sweeping up or handling spilled material. Dispose of the absorbed peroxyacetic acid solution, in small quantities at a time, by placing it on the ground in a remote outdoor area and igniting with a long torch. Empty containers should be washed with a 10% sodium hydroxide solution (NFPA 1984, p. 49-72).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PERACETIC ACID

(79-21-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Strong, pungent, acrid.

Commercial Form - 40% solution in acetic acid contained in 65-lb glass carboys and 250-lb aluminum drums.

Uses - Bactericide, fungicide, sterilizing agent, bleaching agent, polymerization catalyst for polyester resins, manufacture of glycerol and epoxy compounds.

Materials to Avoid - Organic materials, olefins.

Caution: *Peracetic acid is a strong oxidizer. Fire or other violent reactions may occur upon contact with combustible organic material.*

Other Names - Acetic peroxide, acetyl hydroperoxide, Desoxon 1, ethaneperoxoic acid, Obson AC, peroxyacetic acid.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Peracetic Acid Exposure:

Signs and symptoms of acute ingestion of peracetic acid may include corrosion of mucous membranes of mouth, throat, and esophagus with immediate pain and dysphagia (difficulty swallowing); ingestion may cause gastrointestinal tract irritation. Inhalation of vapors or fumes may result in respiratory tract irritation; peracetic acid is highly irritating to the skin and eyes.

PERACETIC ACID

Emergency Life-Support Procedures:

Acute exposure to peracetic acid may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to peracetic acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to peracetic acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

PERACETIC ACID

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL CHLOROFORMATE

CAS Registry Number: 79-22-1

Synonyms: Carbonochloridic Acid, Methyl Ester; Chlorocarbonic Acid, Methyl Ester; Chloroformic Acid Methyl Ester; Formic Acid, Chloro-, Methyl Ester; K-Stoff; Methoxycarbonyl Chloride; Methyl Chlorocarbonate; TL 438

Chemical Formula: $C_2H_3ClO_2$

Molecular Weight: 94.50

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.185 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 160°F, 71.0°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.223 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): 3.26 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (Sax 1984, p. 1826)

Appearance and Odor: Clear liquid (*Merck 1976)

METHYL CHLOROFORMATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1826)
Skin: Yes (Sax 1984, p.1826)
Ingestion: Yes (Sax 1984, p. 1826)

Health Hazards (Acute, Delayed, and Chronic): Methyl chloroformate is highly toxic upon inhalation and upon ingestion (*Merck 1976; Sax 1984, p. 1826). A concentration of 1 mg/liter (190 ppm) has been lethal in 10 minutes (*Clayton and Clayton 1981-82). It is corrosive and irritating to skin (*Hawley 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 54°F (no method given) (*Sax 1979)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray, and foam. For large fires, use water spray, fog, or foam. Move container from fire area if it can be done without risk. Cool containers exposed to flames with water (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: This chemical is very dangerous when exposed to heat sources, sparks, flame, or oxidizers. It will react with water or steam to produce toxic and corrosive fumes (*Sax 1979). Vapors may travel to a source of ignition and flash back. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 28).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

METHYL CHLOROFORMATE

SECTION V (continued)

Conditions to Avoid: Heat or steam should be avoided (*Sax 1979).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Toxic fumes of phosgene are produced when the material is heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes (*Sax 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Methyl chloroformate is used in organic synthesis and in manufacturing of insecticides (*Hawley 1977). It was used as a warfare agent during World War I (*Clayton and Clayton 1981-82).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors and contact with skin (see Section III above). In case of contact, immediately flush skin or eyes with water. Remove and isolate contaminated clothing. Runoff from fire control or dilution water should be contained for later disposal. In case of a small spill, take up with sand or other noncombustible absorbent material and place in containers for later disposal. In case of a large spill, dike far ahead of the spill for later disposal. In case of spills or leaks, shut off ignition sources, and have no flares, smoking, or flames in hazard area. Do not touch spilled material and use water spray to reduce vapors (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

METHYL CHLOROFORMATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: It is an irritant to the skin and is corrosive by ingestion or inhalation. Concentrations of 10 ppm have caused lachrymation and a concentration of 190 ppm for 10 minutes has been lethal to humans. Irritation of the lung and eyes may persist after cessation of exposure. Skin allergies may also occur (*Clayton and Clayton 1981-82). After 2-3 inhalations, brief initial irritation may occur followed by massive symptoms (heavy cough) after 36 hours. Relapses may occur in following days with eventual full recovery (*Schuckmann 1972).

Emergency and First Aid Procedures: Move victim to fresh air and call emergency medical care. If not breathing, give artificial respiration; if breathing is difficult, provide oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Since effects may be delayed, keep careful watch on the victim (DOT 1984, Guide 28).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL 2-CHLOROACRYLATE

CAS Registry Number: 80-63-7

Synonyms: 2-Chloroacrylic Acid, Methyl Ester; 2-Propenoic Acid, 2-Chloro-, Methyl Ester; Acrylic Acid, 2-Chloro-, Methyl Ester; Methyl Alpha-Chloroacrylate; Propenoic Acid, 2-Chloro-, Methyl Ester

Chemical Formula: $C_4H_5ClO_2$

Molecular Weight: 120.54

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.5 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 126°F, 52°C at 51 mmHg (*Weast 1979)

Specific Gravity (H_2O=1): 1.189 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Colorless liquid (*Lefaux 1968)

METHYL 2-CHLOROACRYLATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Lefaux 1968)
Skin: Yes (*Lefaux 1968)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): It is a skin, eye, and lung irritant. The least trace on skin raises large blisters. It is also a respiratory poison; breathing the vapors can cause pulmonary edema (*Lefaux 1968).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Fight fire from maximum distance. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

METHYL 2-CHLOROACRYLATE

SECTION V (continued)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used to make acrylic high polymer with properties closely resembling those of polymethylmethacrylate (*Lefaux 1968). Monomer for specialty polymers (e.g., aircraft glazing) (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: A trace on skin causes large blisters. Inhalation of high concentrations may cause rapid breathing, headache, nausea, lethargy, pulmonary edema, convulsions, and death (Gosselin 1984, p. II-409).

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. 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. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- WARFARIN

CAS Registry Number: 81-81-2

Synonyms: Coumarin,3-(alpha-Acetonylbenzyl)-4-Hydroxy-; 1-(4'-hydroxy-3'-coumarinyl)-1-phenyl-3-butanone; 2H-1-benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl); 3-(1'-phenyl-2'- acetylethyl)-4-hydroxycoumarin; 3-(alpha-acetonylbenzyl)-4-hydroxycoumarin; 200 Coumarin; Athrombine-K; Brumolin; Compound 42; Coumadin; Coumafen; Coumafene; Coumarin, 3-(alpha-acetonylbenzyl)-4-hydroxy; Coumarin, 4-hydroxy-3(1-phenyl-3-oxo-butyl)-; Coumefene; D-Con; Dethmor; Dethnel; Eastern States Duocide; Fasco Fascrat Powder; Frass-Ratron; Kumader; Kumadu; Kypfarin; Maag Rattentod Cum; Mar-Frin; Maveran; Prothromadin; Rat-a-way; Rat-b-gon; Rat-Gard; Rat-Kill; Rat-Mix; Rat-ola; Ratron; Rats-No-More; Rodafarin; Temus W; Warf 42; Warf Compound 42; Warf-12; Warfarat; Warficide; Zoocoumarin; Co-Rax; Cov-R-Tox; Liqua-Tox; Martin's Mar-Frin; Mouse- Pak; Rat and Mice Bait; Rat-o-cide #2; Rat-trol; Ratorex; Ratox; Ratoxin; Ratron G; Rax; Ro-deth; Rodex, Rodex Blox; Rosex; Rough and Ready Mouse Mix; Solfarin; Spray-trol Brand Roden-trol; Tox-Hid; Twin light rat away; Vampirinip II & III; Waran; Warfarin plus; Warfarin Q; 3-(alpha-Phenyl-beta- Acetylethyl)-4-Hydroxycoumarin; 3-(Acetonylbenzyl)-4-Hydroxycoumarin; 4-Hydroxy-3(3-oxo-1-Phenylbutyl)-2H-1-Benzopyran-2-one

Chemical Formula: $C_{19}H_{16}O_4$

Molecular Weight: 308.32

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.32 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

WARFARIN

SECTION II (continued)

Vapor Pressure (mmHg): Not Found

Melting Point: 322°F, 161°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Weast 1979)

Appearance and Odor: Odorless and colorless solid (*Sax 1984).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 mg/m^3 (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.1 mg/m^3; STEL 0.3 mg/m^3 (*ACGIH 1980)

IDLH: 200 mg/m^3 (*NIOSH/OSHA 1981)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (*Arena 1974)
Ingestion: Yes (*Morgan 1982)

Health Hazards (Acute, Delayed, and Chronic): It is classified as very toxic. Probable oral lethal dose in humans is 50-500 mg/kg, between 1 teaspoon and 1 ounce for a 150 lb. person (*Gosselin 1976). Material is an anticoagulant. Toxic effects other than hemorrhage are rarely seen in humans (*Goodman 1975). Material is believed to be teratogenic in humans (*Hayes 1982).

Medical Conditions Generally Aggravated by Exposure: Persons with a history of blood disorders with bleeding tendencies would be expected to be at increased risk from exposure (*NIOSH/OSHA 1981).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poison B Solid) Extinguish fire using agent suitable for type of surrounding fire. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 416).

Special Fire Fighting Procedures: (Non-Specific -- Poison B Solid) Wear full protective clothing and self-contained breathing apparatus (Student 1981, p. 416).

WARFARIN

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Contact with strong oxidizers may cause fires and explosions (*NIOSH/OSHA 1981).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Strong oxidizers (*NIOSH/OSHA 1981)

Hazardous Decomposition or Byproducts: Toxic gases and vapors (e.g., carbon monoxide) may be released in heating to decomposition (*NIOSH/OSHA 1981).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Material is used as a rodenticide for Norway rats and for house mice (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material (see Section III above). Eating and smoking should not be permitted in areas where it is handled, processed or stored. For small spills: sweep onto paper or other suitable material. Place in an appropriate container and burn in a safe place. Large quantities may be destroyed by dissolving in a flammable solvent (e.g., alcohol) and atomizing in a combustion chamber (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

WARFARIN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms begin a few days or weeks after ingestion. They include nose bleed, bleeding gums, pallor, and sometimes hematomas around joints and on buttocks, blood in urine and feces. Later, paralysis due to cerebral hemorrhage, and finally hemorrhagic shock and death may occur (*Doull 1980).

Emergency and First Aid Procedures: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIPHACINONE

CAS Registry Number: 82-66-6

Synonyms: 1,3-Indandione, 2-Diphenylacetyl-; 2-(Diphenylacetyl)-1H-Indene-1,3(2H)-Dione; 2-(Diphenylacetyl)Indan-1,3-Dione; 2-Diphenylacetyl-1,3-Diketohydrindene; 2-Diphenylacetyl-1,3-Indanedione; Diandin; Didandin; Didion; Difacione; Dipaxin; Diphacin; Diphenacin; Diphenandione; Oragulant; PID; Promar; Ramik; Ratindan 1; Solvan; U1363; 1H-Indene-1,3(2H)-Dione, 2-(Diphenylacetyl)-

Chemical Formula: $C_{23}H_{16}O_3$

Molecular Weight: 340.38

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mammal) 0.91 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for *notification* under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 295-297°F, 146-147°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (*Merck 1976); 17 mg/liter (Farm Chemicals Handbook 1984, p. C-82)

DIPHACINONE

SECTION II (continued)

Appearance and Odor: Pale yellow crystals (*Merck 1976); odorless (*Osol 1975)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1231)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; probable oral lethal dose in humans is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150-lb. person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Many medical conditions will be aggravated by this material (*Goodman 1980).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: The material is similar to coumarin and indandione (*Morgan 1982). (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition it emits acrid smoke and fumes (Sax 1984, p. 1231).

NFPA Flammability Rating: Not Found

DIPHACINONE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Sensitive to light (*Worthing 1979)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 1231).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Rodenticide (*Worthing 1979); and anticoagulant medication (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIPHACINONE

(82-66-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Pale yellow crystals.

Odor - None.

Commercial Forms - 95% pure yellow powder, 5-mg tablets.

Use - Rodenticide.

Other Names - Diandin; Didandin; Diphacin; Diphenadione; 2-diphenylacetyl-1,3-indanedione; Promar; Ramik; Solvan.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, vitamin K (phytonadione).

Signs and Symptoms of Acute Diphacinone Exposure:

Diphacinone is an anticoagulant. Hemorrhage is the most common effect and may be manifested by nose bleeding, gum bleeding, bloody stools and urine, ecchymoses (extravasations of blood into skin), and hemoptysis (coughing up of blood). Bruising is heightened. Abdominal and flank pain are also common. Other signs and symptoms include flushing, dizziness, hypotension (low blood pressure), dyspnea (shortness of breath), cyanosis (blue tint to the skin and mucous membranes), fever, and diarrhea.

Emergency Life-Support Procedures:

Acute exposure to diphacinone may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles

DIPHACINONE

should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to diphacinone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to diphacinone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital

DIPHACINONE

for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of diphacinone is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of diphacinone may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- AZINPHOS-METHYL

CAS Registry Number: 86-50-0

Synonyms: Methyl Guthion; 1,2,3-Benzotriazin-4(3H)-one, 3-(Mercapto-methyl)-, O,O-Dimethyl Phosphorodithioate; 3-(Mercaptomethyl)-1,2,3-Benzotriazin-4(3H)-one O,O- Dimethyl Phosphorodithioate S-Ester; Bay 17147; Bay 9027; Bayer 17147; Bayer 9027; Benzotriazine Derivative of a Methyl Dithiophosphate; Benzotriazinedithiophosphoric Acid Dimethoxy Ester; Carfene; Cotneon; Cotnion; Cotnion Methyl; Crysthion 2L; Crysthyon; DBD; Dimethyldithiophosphoric Acid N-Methylbenzazimide Ester; ENT 23,233; Gothnion; Gusathion; Gusathion 25; Gusathion K; Gusathion M; Gusathion Methyl; Gusathion-20; Guthion; Methyl Azinphos; Methyl Gusathion; Metiltriazotion; N-Methylbenzazimide, Dimethyldithiophosphoric Acid Ester; NCI-C00066; O,O-Dimethyl S-(3,4-Dihydro-4-Keto-1,2,3-Benzotriazinyl-3-Methyl) Dithiophosphate; O,O-Dimethyl S-(4-Oxo-1,2,3-Benzotriazino(3)-Methyl) Thiothionophosphate; O,O-Dimethyl S-(4-Oxo-3H-1,2,3-Benzotriazine-3-Methyl) Phosphorodithioate; O,O-Dimethyl S-(4-Oxobenzotriazino-3-Methyl) Phosphorodithioate; O,O-Dimethyl S-4-Oxo-1,2,3-Benzotriazin-3(4H)-ylmethyl Phosphorodithioate; O,O-Dimethyl-S-(1,2,3-Benzotriazinyl-4-Keto)Methyl Phosphorodithioate; O,O-Dimethyl-S-(Benzaziminomethyl) Dithiophosphate; Phosphorodithioic Acid, O,O-Dimethyl Ester, S-Ester With 3-(Mercaptomethyl)-1,2,3-Benzotriazin-4(3H)-one; Phosphorodithioic Acid, O,O-Dimethyl S-((4-Oxo-1,2,3-Benzotriazin-3(4H)-yl)Methyl) Ester; Phosphorodithioic Acid, O,O-Dimethyl S-(4-Oxo-1,2,3-Benzotriazin-3(4H)-ylmethyl)Ester; R 1582; S-(3,4-Dihydro-4-Oxo-1,2,3-Benzotriazin-3-ylmethyl) O,O-Dimethyl Phosphorodithioate; S-(3,4-Dihydro-4-Oxo-Benzo(alpha)-(1,2,3-Triazin-3-yl Methyl) O,O-Dimethyl Phosphorodithioate

Chemical Formula: $C_{10}H_{12}N_3O_3PS_2$

Molecular Weight: 317.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.069 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): No

AZINPHOS-METHYL

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.44 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): Negligible at 20°C (*Worthing 1979)

Melting Point: 163-165°F; 73-74°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 33 ppm at room temperature (*Worthing 1979)

Appearance and Odor: White crystals (*Worthing 1979) or brown waxy solid (*Hawley 1981)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.2 mg/m^3 (NIOSH 1987, p.54)

ACGIH TLV: TWA 0.2 mg/m^3 (ACGIH 1986-87, p. 10)

IDLH: 5 mg/m^3 (NIOSH 1987, p.54)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hayes 1982, p. 358)
Skin: Yes (Hayes 1982, p. 358)
Ingestion: Yes (Hayes 1982, p. 358)

Health Hazards (Acute, Delayed, and Chronic): Acute: extremely toxic. Probable oral lethal dose in humans is 5-50 mg/kg, or between 7 drops and 1 teaspoon for a 70 kg (150 lb.) person. A potent cholinesterase inhibitor which can cause death (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (*DOT 1984).

AZINPHOS-METHYL

SECTION IV (continued)

Special Fire Fighting Procedures: Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (*DOT 1984).

Unusual Fire and Explosion Hazards: Some of the formulations may burn, but none of them ignite easily. Container may explode in the heat of the fire (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Unstable at temperatures above 390°F (200°C) (*Worthing 1979)
Stable:

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Rapidly hydrolyzed by cold alkali or cold acid (*Worthing 1979)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide for control of pests on a wide range of crops. Used to control boll weevil on cotton, and for control of insects on deciduous fruits, nuts, vegetables, field crops, citrus, and for non-agricultural use (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site (*DOT 1984). Do not touch spilled material. Stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (*DOT 1984).

AZINPHOS-METHYL

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for AZINPHOS-METHYL

(86-50-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White crystals.

Commercial Forms - Waxy brown solid, 50% wettable powder or water emulsion.

Use - Insecticide.

Other Names - 1,2,3-Benzotriazin-4(3H)-one, 3-(mercaptomethyl)-, O,O-dimethyl phosphorodithioate; Carfene; Cotneon; Cotnion-Methyl; Crysthyon; Gusathion M; Guthion.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Azinphos-Methyl Exposure:

Warning: *Effects may be delayed up to 12 hours. Caution is advised.*

Note: Azinphos-methyl is a cholinesterase inhibitor.

Acute exposure to azinphos-methyl may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Chest pain may be noted. Hypotension (low blood pressure) may be observed, although hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

AZINPHOS-METHYL

Emergency Life-Support Procedures:

Acute exposure to azinphos-methyl may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to azinphos-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to azinphos-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

AZINPHOS-METHYL

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of azinphos-methyl is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of azinphos-methyl may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ANTU

CAS Registry Number: 86-88-4

Synonyms: Urea, 1-(1-Naphthyl)-2-Thio-; alpha-Naphthylthiourea; 1-(1-Naphthyl)-2-Thiourea; 1-(1-Naphthyl)Thiourea; 1-Naphthyl Thiourea; 1-Naphthylthiourea; alpha-Naphthothiourea; alpha-Naphthylthiocarbamide; alphanaphthyl Thiourea; Alrato; Anturat; Bantu; Chemical 109; Dirax; Kill Kantz; Kripid; Krysid; Krysid PI; N-(1-Naphthyl)-2-Thiourea; N-1-Naphthylthiourea; Naphtox; Rat-Tu; Rattrack; Smeesana; Thiourea, 1-Naphthalenyl-; U-5227; USAF EK-P-5976

Chemical Formula: $C_{11}H_{10}N_2S$

Molecular Weight: 202.23

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (dog) 0.38 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0 at 25°C (*Sax 1975)

Melting Point: 388°F, 198°C (*Merck 1976)

Vapor Density (AIR=1): 6.99 (*NIH EPA, OHM/TADS 1984)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.6 g/L water at 25°C (*Merck 1976)

ANTU

SECTION II (continued)

Appearance and Odor: White crystal or powder; technical product is gray powder (*Clarke 1981). No odor (*ACGIH 1980); bitter taste (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.3 mg/m^3 (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.3 mg/m^3 (ACGIH 1986-87, p.10)

IDLH: 100 mg/m^3 (*NIH EPA, OHM/TADS 1984)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Moderately toxic: probable oral lethal dose (human) 0.5-5 gm/kg, or between 1 ounce and 1 pint (or 1 lb.) for 150 lb. person (*Gosselin 1976). Chronic sublethal exposure may cause antithyroid activity. Can produce hyperglycemia of three times normal in three hours (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: People with chronic respiratory disease or liver disease may be especially at risk (*NIOSH/OSHA 1981).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): May burn but will not ignite readily (*DOT 1984)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Stay upwind, and out of low areas. Wear self-contained breathing apparatus and full protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Emits toxic fumes upon decomposition (*Sax 1975).

NFPA Flammability Rating: Not Found

ANTU

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Decomposing heat (*Sax 1975)

Incompatibility (Materials to Avoid): It reacts with silver nitrate and strong oxidizers (*Sax 1975)

Hazardous Decomposition or Byproducts: When heated it emits sulfur dioxide, oxides of nitrogen, and carbon monoxide (*NIOSH/OSHA 1981).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material was used primarily as a rodenticide for control of adult Norway rats. It is not produced commercially in the U.S. (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). Do not touch spilled material, stay upwind, keep out of low areas, deny entry (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include seizures, pulmonary edema and dermal irritation (*Rumack 1975 to Present). Ingestion may cause vomiting, shortness of breath, and bluish discoloration of the skin (*NIOSH/OSHA 1981).

Emergency and First Aid Procedures: Move victim to fresh air. Treat pulmonary edema with positive pressure oxygen (*Rumack 1975 to Present). Immediately flush with fresh water for at least 15 minutes in case of skin or eye contact (*Gosselin 1976).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDE TY -- FLUOROACETIC ACID

CAS Registry Nu r: 144-49-0

Synonyms: Ace d, Fluoro-; 2-Fluoroacetic Acid; alpha-Fluoroacetic Acid; Cymonic Acid; uoroethanoic Acid; Gifblaar Poison; HFA; MFA; Monofluoroacetic Acid

Chemical Formula: $C_2H_3FO_2$

Molecular Weight: 78.04

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 0.468 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 329°F, 165°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.3693 at 97°F, 36°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: 95.4°F, 35.2°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Weast 1983, p. 597)

Appearance and Odor: Colorless crystals (*Hawley 1977)

FLUOROACETIC ACID

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.05 mg/m^3 (for sodium salt) (OSHA 1984, p. 663)

ACGIH TLV: TWA 0.05 mg/m^3; STEL 0.15 mg/m^3 (for sodium salt) (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: IDLH for sodium salt: 5 mg/m^3 (NIOSH/OSHA 1978, p. 166).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): This material is very toxic; ingestion of small quantities may cause death (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Burns (*Merck 1976)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 59).

Special Fire Fighting Procedures: Stay upwind; keep out of low areas. Wear self-contained, positive pressure breathing apparatus and full protective clothing. Move container from fire area. Cool containers that are exposed to flames with water from the side until well after fire is out (DOT 1984, Guide 59).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits highly toxic fumes of fluorine containing compounds (*Sax 1979). Some of these materials may burn but none ignite readily. These materials may ignite combustibles (wood, paper, oil, etc.) (DOT 1984, Guide 59).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Encyc Occupat Health and Safety 1971)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

FLUOROACETIC ACID

SECTION V (continued)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of fluorine containing compounds (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Rodenticide (Hawley 1981, p. 470). The sodium salt of this material is used as a rodent poison (*Patty 1963).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material. Stop leak if you can do so without risk. Stay upwind; keep out of low areas. Use water spray to reduce vapors. For small spills, take up with sand or other noncombustible absorbent material and place into containers for later disposal. For large spills, dike spill for later disposal (DOT 1984, Guide 59).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Butyl/Neoprene	GOOD/LIMITED**
CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PE	POOR/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

FLUOROACETIC ACID

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: The major symptoms of fluoroacetic acid poisoning include severe epileptiform convulsions alternating with coma and depression; death may result from asphyxia during convulsion or from respiratory failure. Cardiac irregularities, such as ventricular fibrillation and sudden cardiac arrest, nausea, vomiting, excessive salivation, numbness, tingling sensations, epigastric pain, mental apprehension, muscular twitching, low blood pressure, and blurred vision may also occur (*Encyc Occupat Health and Safety 1971).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 59).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDE TITY -- DICHLOROMETHYLPHENYLSILANE

CAS Registry N er: 149-74-6

Synonyms: Met henyldichlorosilane; Phenylmethyldichlorosilane; Silane, Dichloromethylp. yl-

Chemical Formula: $C_7H_8Cl_2Si$

Molecular Weight: 191.14

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse) 0.2 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 401°F, 205°C (Hawley 1981, p. 688)

Specific Gravity (H_2O=1): 1.19 (*Hawley 1977)

Vapor Pressure (mmHg): 1.0 at 35.7°C (Perry 1984, p. 3-54)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Colorless liquid (*Hawley 1977)

DICHLOROMETHYLPHENYLSILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): The chemical is toxic and is an irritant (*Hawley 1977). Contact may cause burns to the skin and eyes (DOT 1984, Guide 29).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 83°F (28°C) (*Hawley 1977) (SUSPECT)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Isolate for 1/2 mile in all directions if tank car or truck is involved in a fire. Wear self-contained (positive pressure) breathing apparatus with full protective clothing. Do not get water inside container (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of chlorine-containing compounds (Sax 1984, p. 951). 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. Fire may produce irritating or poisonous gases (DOT 1984, Guide 29).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

DICHLOROMETHYLPHENYLSILANE

SECTION V (continued)

Incompatibility (Materials to Avoid): Reacts strongly with oxidizing materials (*Hawley 1977)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorine-containing compounds (Sax 1984, p. 951).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacture of silicones (*Hawley 1977); and as a chemical intermediate for silicone fluids, resins and elastomers (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away. Stay upwind. Stay out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors; do not get water inside container. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material; immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 29).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHOXYETHYLMERCURIC ACETATE

CAS Registry Number: 151-38-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 657) Mercury, (Acetato)(2-Methoxyethyl -; Acetato(2-Methoxyethyl)Mercury; Landisan; MeEHg; MEMA; Mercuran; Mercury, Acetoxy(2-Methoxyethyl)-; Radosan; Methoxyethyl Mercuric Acetate
(Farm Chemicals Handbook 1984, p. C148) Panogen

Chemical Formula: $C_5H_{10}HgO_3$

Molecular Weight: 318.74

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 16 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Mercury Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Sax 1984, p. 1776)

Appearance and Odor: Crystals (Sax 1984, p. 1776)

METHOXYETHYLMERCURIC ACETATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Mercury alkyl compounds) TWA 0.01 mg/m^3, as mercury; Ceiling 40 mg/m^3, as mercury (NIOSH 1987, p. 152)

ACGIH TLV: (Mercury alkyl compounds) TWA 0.01 mg/m^3, as mercury; STEL 30 mg/m^3, as mercury (skin) (ACGIH 1986-87, p. 22)

IDLH: (Mercury alkyl compounds) 10 mg/m^3, as mercury (NIOSH 1987, p. 152)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Encyc Occupat Health and Safety 1983, p. 1337)
Skin: Yes (Non-Specific -- Mercury Compounds) (Hayes 1982, pp. 15-16)
Ingestion: Yes (Encyc Occupat Health and Safety 1983, p. 1337)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic (Hawley 1981, p. 664). Target organs are brain and central nervous system (Hayes 1982, pp. 18-19). Inhalation can cause lung damage; ingestion can cause kidney damage. Women of childbearing age should avoid exposure (Encyc Occupat Health and Safety 1983, p. 1337).

Medical Conditions Generally Aggravated by Exposure: Women of childbearing age and persons with eczema, renal or neurological disorders should not be exposed to mercurials (Encyc Occupat Health and Safety, 1983, p. 1337).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This is an alkyl mercury pesticide (Hayes 1982, p. 20). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This is an alkyl mercury pesticide (Hayes 1982, p. 20). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorites (DOT 1984, Guide 55).

METHOXYETHYLMERCURIC ACETATE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of mercury (Sax 1984, p. 1776). This material may burn but does not ignite readily. Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits toxic fumes of mercury (Sax 1984, p. 1776).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a pesticide in seed treatment for cotton and small grains. It is no longer approved for this use (Farm Chemicals Handbook 1984, pp. C144-148). It exhibits high fungicidal activity against leaf stripe of barley, stinking smut of wheat, snow mold of rye; against seedling diseases in beets and legumes, and for dressing "seed" potatoes, bulbs, and tubers (Buchel 1983, pp. 250-51). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This is an alkyl mercury pesticide (Hayes 1982, p. 20). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

METHOXYETHYLMERCURIC ACETATE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This is an alkyl mercury pesticide. Patients complain of headache, paresthesia of tongue, lips, fingers, and toes, a metallic taste in mouth, gastrointestinal disturbances, gas, and diarrhea. Nervous system symptoms may appear first after a relatively slight exposure or have a latency period of several weeks. These symptoms include fine tremors of extended hands, loss of side vision, slight loss of coordination, loss of coordination of speech, writing and gait. Uncoordination may progress to loss of ability to control voluntary movements. Irritability and bad temper may progress to mania. Stupor or coma may develop. Blisters or dermatitis may be present on skin. Symptoms persist for years even in cases of mild exposure (Hayes 1982, pp. 20-21).

Emergency and First Aid Procedures: This is an alkyl mercury pesticide (Hayes 1982, p. 20). Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Weast 1979
ACGIH 1983
NIOSH/OSHA 1978
Weiss 1980
Merck 1983
Clayton and Clayton 1981-82
Student 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- POTASSIUM CYANIDE

CAS Registry Number: 151-50-8

Synonyms: Cyanide of Potassium; Hydrocyanic Acid, Potassium Salt; Potassium Cyanide (KCN)

Chemical Formula: KCN

Molecular Weight: 65.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rabbit) 5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.52 at 16°C (Weast 1978, p. B150)

Vapor Pressure (mmHg): Not Found

Melting Point: 1173°F, 634°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 2 parts cold water or 1 part boiling water (*Merck 1976)

Appearance and Odor: White granular powder or lumps with faint odor of bitter almonds (*Merck 1976,* Hawley 1977)

POTASSIUM CYANIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 mg/m^3 as cyanide (*NIOSH/RTECS 1985)

ACGIH TLV: (Cyanides) TWA 5 mg/m^3 as cyanide (skin) (ACGIH 1986-87, p. 14)

IDLH: 50 mg/m^3 (NIOSH/OSHA 1978, p. 74)

Other Limits Recommended: NIOSH Occupational Exposure Recommended Standard -- Air Ceiling 5 mg/m^3 as cyanide, 10 minutes (*NIOSH/RTECS 1985)

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (*Merck 1976)
Ingestion: Yes (*Merck 1976)

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. Probable oral lethal dose in humans is less than 5 mg/kg or less than a taste (7 drops) for a 150 lb. person (*Gosselin 1976). It is an eye and skin irritant (*Grant 1974, *Encyc Occupat Health and Safety 1971). Poisonous in very small quantities; a taste is lethal (*Gosselin 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not flammable (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Water may be used on fire in an area containing potassium cyanide (*NFPA 1978). Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Wear full protective clothing (*NFPA 1978). Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Contact with acid releases highly flammable hydrogen cyanide gas (*NFPA 1978). Moisture may cause this material to volatilize as hydrogen cyanide (*Peer Review Committee).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 766)

Conditions to Avoid: Avoid contact with acids (see Section IV above)

POTASSIUM CYANIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Reacts with acids to produce hydrogen cyanide gas (*NFPA 1978). Reacts with strong oxidizers such as nitrates and chlorates (NIOSH/OSHA 1978, p. 74); nitrogen trichloride; perchloryl fluoride; sodium nitrate; acids; alkaloids; chloral hydrate; iodine (Sax 1984, p. 2273).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of cyanide and nitrogen oxides (Sax 1984, p. 2273).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Potassium cyanide is used for electroplating, steel hardening, extraction of gold and silver from ores, manufacture of some chemicals, and fumigation (*Encyc Occupat Health and Safety 1971).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid water. Cover spilled material with alkali or sodium thiosulfate (*Rumack 1975 to Present). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. 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 materials into clean, dry container and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

PVC	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

POTASSIUM CYANIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for POTASSIUM CYANIDE

(151-50-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Potassium cyanide toxicity can occur via ingestion, dermal/eye contact, or inhalation; death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility!*

Substance Characteristics:

Pure Forms - White, amorphous, deliquescent lumps or crystalline mass.

Odor - Faint odor of bitter almonds.

Commercial Forms - Pure form, solution, or reagent in 25- and 100-pound drums.

Uses - Electroplating, steel hardening, gold and silver extraction, fumigation, insecticide, chemical intermediate.

Materials to Avoid - Acids.

Caution: *Avoid sources of extreme heat including fire. Potassium cyanide will emit toxic cyanide and nitrogen oxide fumes when heated to decomposition.*

Other Names - Cyanide of potassium; hydrocyanic acid, potassium salt.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), sodium bicarbonate, diazepam, phenytoin.

Signs and Symptoms of Acute Potassium Cyanide Exposure:

Warning: *Effects may be delayed. Caution is advised. Vital signs should be monitored closely. Heart palpitation may occur within minutes after exposure.*

POTASSIUM CYANIDE

Signs and symptoms of acute exposure to potassium cyanide may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cardiac arrhythmias and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous membranes), and cherry-red or bloody mucous membranes may appear.

Tachypnea (rapid respiratory rate) may be followed by respiratory depression. Lung hemorrhage and pulmonary edema may occur. Headache, vertigo (dizziness), agitation, and giddiness may precede combative behavior, convulsions, paralysis, protruding eyeballs, dilated and unreactive pupils, and coma.

Potassium cyanide is irritating to the skin, eyes, and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common. Salivation, nausea, and vomiting may also occur.

Emergency Life-Support Procedures:

Acute exposure to potassium cyanide may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to potassium cyanide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with potassium cyanide-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

POTASSIUM CYANIDE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to potassium cyanide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with potassium cyanide-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with potassium cyanide-contaminated persons or their gastric contents can result in self-poisoning.*

2. RUSH to a health care facility!

3. DO NOT induce vomiting. Ipecac is not recommended for ingestion of potassium cyanide.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

POTASSIUM CYANIDE

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHYLENEIMINE

CAS Registry Number: 151-56-4

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 291) Aminoethylene; Azacyclopropane; Azirane; Aziridine; 1H-Azirine, dihydro-; Dihydroazirene; Dimethyleneimine; Dimethylenimine; EI; Ethylenimine; ENT-50324, Ethylimine.

Chemical Formula: C_2H_5N

Molecular Weight: 43.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.1 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 131-133°F, 55-56°C (Clayton and Clayton 1981-82, p. 2673)

Specific Gravity (H_2O=1): 0.8321 at 20°C (Clayton and Clayton 1981-82, p. 2673)

Vapor Pressure (mmHg): 160 at 20°C (Clayton and Clayton 1981-82, p. 2673)

Melting Point: -98°F, -72°C (Freezing Point) (Clayton and Clayton 1981-82, p. 2673)

Vapor Density (AIR=1): 1.48 (Clayton and Clayton 1981-82, p. 2673)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (Merck 1983, p. 3744)

ETHYLENEIMINE

SECTION II (continued)

Appearance and Odor: Colorless, mobile fluid with a strong ammoniacal odor (Clayton and Clayton 1981-82, p. 2673; Merck 1983, p. 3744)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Occupational carcinogen; no permissible exposure limit (NIOSH 1987, Appendix C)

ACGIH TLV: TWA 0.5ppm (1.0 mg/m^3) (skin) (ACGIH 1986-87, p. 19)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 443)
Skin: Yes (Weiss 1980, p. 443)
Ingestion: Yes (Weiss 1980, p. 443)

Health Hazards (Acute, Delayed, and Chronic): Ethyleneimine is classified as extremely toxic with a probable oral lethal dose of 5-50 mg/kg which is approximately 7 drops to 1 teaspoonful for a 70 kg (150 lb.) person (*Gosselin 1976). Ethyleneimine gives inadequate warning when over-exposure is by inhalation or skin absorption. It is a severe blistering agent, causing third degree chemical burns of the skin. Also, it has a corrosive effect on mucous membranes and may cause scarring of the esophagus. It is corrosive to eye tissue and may cause permanent corneal opacity and conjunctival scarring (Weiss 1980, p. 443). Severe exposure may result in overwhelming pulmonary edema. Renal damage has been described (Gosselin 1984, p. II-207). Hemorrhagic congestion of all internal organs has been observed (Clayton and Clayton 1981-82, p. 2674).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 12°F (CC) (NFPA 1984, p. 325M-51)
Flammable Limits:
LEL: 3.6% (NFPA 1984, p. 325M-51)
UEL: 46% (NFPA 1984, p. 325M-51)

Extinguishing Methods: Dry chemical, alcohol foam, or carbon dioxide are useful for small fires. For large fires: water spray, fog or foam (DOT 1984, Guide 30).

Special Fire Fighting Procedures: Do not extinguish fire unless flow can be stopped; use water in flooding quantities as a fog. Solid streams of water may be ineffective. Apply water from as far a distance as possible (Student 1981, p. 236). If tank car or truck is involved in fire, isolate the surrounding area in a 1/2 mile radius (DOT 1984, Guide 30).

ETHYLENEIMINE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Irritating vapors are generated when heated. Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back. May polymerize in fires with evolution of heat and container rupture (Weiss 1980, p. 443). Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 30). Ethyleneimine vapors are not inhibited and may form polymers in vents or flame arresters, r[illegible]lting in stopping of the vents (*NFPA 1978).

NFPA Flammabili[illegible] Rating: 3

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 443)

Conditions to Avoid: If heated under pressure, instability may result (Weiss 1980, p. 443).

Incompatibility (Materials to Avoid): Acids (Weiss 1980, p. 443); sodium hypochlorite (*Bretherick 1979).

Hazardous Decomposition or Byproducts: Toxic oxides of nitrogen are produced during combustion (Student 1981, p. 236). Upon treatment with sodium hypochlorite, it gives off the explosive compound 1-chloroazidine (*Bretherick 1979).

Hazardous Polymerization: May Occur: Yes (Merck 1983, p. 551)
May Not Occur:

Conditions to Avoid: Avoid contact with silver or aluminum. Explosive polymerization may occur upon contact with acids (Weiss 1980, p. 443). Polymerization is catalyzed by carbon dioxide (*Bretherick 1979).

SECTION VI -- USE INFORMATION

Products of polymerization of ethyleneimine are used in the paper industry and as flocculation aids (*Encyc Occupat Health and Safety 1971). Used in textile chemicals, adhesives, binders, petroleum refining chemicals, fuels and lubricants, coating resins, varnishes, lacquers, agricultural chemicals, cosmetics, ion exchange resins, photographic chemicals and surfactants (*Clayton and Clayton 1981-82).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of

ETHYLENEIMINE

SECTION VII (continued)

water or soap and water (Student 1981, p. 237). Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind, keep out of low areas (DOT 1984, Guide 30).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Neoprene	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include tearing and burning of the eyes, sore throat, nausea, vomiting, coughing (may persist for weeks or months) and a slow healing dermatitis due to severe blistering (Gosselin 1984, p. II-207; Weiss 1980, p. 443).

Emergency and First Aid Procedures: Move victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with ethyleneimine, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 30).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIPHOSPHORAMIDE, OCTAMETHYL-

CAS Registry Number: 152-16-9

Synonyms: Pyrophosphoramide, Octamethyl-; Bis(bisdimethylaminophosphonous) anhydride; Bis(dimethylamino)phosphoric anhydride; Bis-N,N,N',N'-tetramethyl-phosphorodiamidic anhydride; Lethalaire G-59; Octamethyl pyrophosphortetramide; Octamethyl tetramido pyrophosphate; Octamethyldiphosphoramide; Octamethyl-pyrophosphoramide; Octamethylpyrophosphoric acid tetramide; OMPA; Ompacide; Ompatox; Ompax; Pestox III; Schradan; Pyrophosphoric acid octamethyltetraamide; Pyrophosphoryltetrakisdimethylamide; Scharadan; Systam; Systophos; Sytam; Tetrakisdimethylaminophosphonous anhydride

Chemical Formula: $C_8H_{24}N_4P_2O_3$

Molecular Weight: 286.26

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 248-257°F, 120-125°C at 0.5 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.09 at 25°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 0.001 at 25°C (*Worthing 1979)

Melting Point: 57-68°F, 14-20°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Merck 1976)

DIPHOSPHORAMIDE, OCTAMETHYL-

SECTION II (continued)

Appearance and Odor: Viscous liquid (*Merck 1976); dark brown viscous liquid (*Worthing 1979).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Maximum permissible atmospheric concentration of this compound in work places is estimated to be 0.5 mg/m^3 (*Clarke 1975).

Routes of Entry: **Inhalation:** Yes (*Encyc Occupat Health and Safety 1971)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic; probable oral lethal dose in humans is 5-50 mg/kg, between 7 drops and 1 teaspoonful for a 150 lb. person (*Gosselin 1976). It is highly toxic when inhaled (*Encyc Occupat Health and Safety 1971). Material is a cholinesterase inhibitor (*Hayes, 1975). It is similar in action to other organophosphorous pesticides in its toxicity. It is slightly less toxic than parathion (*Gosselin 1976). Gastrointestinal, neurologic and respiratory symptoms may accompany poisoning with this material. High doses may cause a toxic psychosis similar to acute alcoholism (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Persons taking phenobarbital and phenaglycodol together, glutethimide, chlorpromazine hydrochloride, or meprobamate may be at greater risk. These drugs appear to enhance the toxicity of the material markedly (*Kato 1967).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Liquid Pesticides) Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use alcohol foam, carbon dioxide, or dry chemical (*Student 1981).

Special Fire Fighting Procedures: Not Found

DIPHOSPHORAMIDE, OCTAMETHYL-

SECTION IV (continued)

Unusual Fire and Explosion Hazards: When heated to decomposition, it can emit highly toxic fumes of oxides of phosphorus (*Sax 1979).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Hydrolyzed under acid conditions to dimethylamine and orthophosphoric acid (*Worthing 1979)

Incompatibility (Materials to Avoid): Decomposes when mixed with acid (*Worthing 1979).

Hazardous Decomposition or Byproducts: Decomposes when mixed with acid (*Worthing 1979). Emits highly toxic fumes of oxides of phosphorous when heated to decomposition (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Material is used as a systemic insecticide for plants and as an acaricide (*Merck 1976). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Liquid Pesticides) Use water spray to knock down vapors. Attempt to stop leak if it can be done without hazard. Avoid breathing vapors. Keep upwind. Avoid bodily contact with material. Do not handle broken packages without protective equipment.
Wash away any material which may have contacted the body with copious amounts of water or soap and water (*Student 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

DIPHOSPHORAMIDE, OCTAMETHYL-

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIPHOSPHORAMIDE, OCTAMETHYL-

(152-16-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Viscous liquid.

Commercial Form - Dark brown viscous liquid (technical grade).

Use - Pesticide.

Caution: *Avoid sources of extreme heat including fire. Diphosphoramide, octamethyl- will liberate toxic phosphorus oxides when heated to decomposition.*

Other Names - OMPA, Omapacide, Ompatox, Ompax, Pestox III, Schradan, Systam, Systophos, Sytam.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Diphosphoramide, Octamethyl- [OMPA] Exposure:

Note: Octamethyl diphosphoramide is a cholinesterase inhibitor.

Acute exposure to OMPA may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) and chest pain may be noted. Hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea, respiratory depression, and respiratory paralysis. Psychosis may occur.

DIPHOSPHORAMIDE, OCTAMETHYL-

Emergency Life-Support Procedures:

Acute exposure to OMPA may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to OMPA.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to OMPA.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

DIPHOSPHORAMIDE, OCTAMETHYL-

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of OMPA is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of OMPA may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOBENZAN

CAS Registry Number: 297-78-9

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 697)
4,7-Methanoisobenzofuran, 1,3,4,5,6,7,8,8-Octachloro-1,3,3a,4,7,7a-Hexahydro-; CP 14,957; ENT 25,545; ENT 25,545-X; 1,3,4,5,6,7,8,8-Octachloro-1,3,3a,4,7,7a-hexahydro-4,7-methanoisobenzofuran; 1,3,4,5,6,7,8,8-Octachloro-2-oxa-3a,4,7,7a-tetrahydro-4,7-methanoindene; 1,3,4,5,6,7,10,10-Octachloro-4,7-endo-methylene-4,7,8,9-tetrahydrophthalan; Omtan; SD 4402; Shell 4402; Shell WL 1650; Telodrin; WL 1650

Chemical Formula: $C_9H_4Cl_8O$

Molecular Weight: 411.73

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (dog) 1 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.87 (Hayes 1982, p. 251)

Vapor Pressure (mmHg): 0.00001 at 77°F, 25°C (Hayes 1982, p. 251)

Melting Point: 248-252°F, 120-122°C (Merck 1983, pp. 738-739)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Hayes 1982, p. 251)

ISOBENZAN

SECTION II (continued)

Appearance and Odor: Crystals (Merck 1983, pp. 738-739). The technical product is a whitish to light-brown crystalline powder with a mild chemical odor (Hayes 1982, p. 251)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hayes 1982, p. 251)
Skin: Yes (Hayes 1982, p. 251)
Ingestion: Yes (Hayes 1982, p. 251)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic. It is absorbed by the skin as well as by the respiratory and gastrointestinal tract. Symptoms may last for a long time because the material is eliminated slowly; its half-life in human blood is 2.77 years (Hayes 1982, p. 251).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Non-flammable and non-explosive (Hayes 1982, p. 251)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Dry Insecticide) Use agent suitable for type of surrounding fire. Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 290).

Special Fire Fighting Procedures: (Non-Specific -- Dry Insecticide) Avoid breathing dusts and fumes from burning material. Keep upwind. Avoid bodily contact with the material. Wear full protective clothing including boots, protective gloves, goggles, and wear self-contained breathing apparatus (Student 1981, p.290).

Unusual Fire and Explosion Hazards: Chlorine is evolved when this material is heated above 410°F, 210°C (Hayes 1982, 251).

NFPA Flammability Rating: Not Found

ISOBENZAN

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Acids, certain metal salts, and catalytically active carriers (Hayes 1982, p. 251)

Hazardous Decomposition or Byproducts: Chlorine is evolved if material is heated above 410°F, 210°C (Hayes 1982, p. 251).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide (Merck 1983, pp. 738-739). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Dry Insecticide) Keep upwind. Avoid bodily contact with the material (Student 1981, p. 290).
(Non-Specific -- Insecticide, Dry, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED**
Butyl/Neoprene	POOR/LIMITED**
PVC	POOR/LIMITED**

ISOBENZAN

SECTION VIII (continued)

Viton	POOR/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms of exposure include headache, dizziness, drowsiness, irritability, and numbness of the legs. Convulsions may occur (Hayes 1982, p. 251).

Emergency and First Aid Procedures: (Non-Specific -- Insecticide, Dry, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THIONAZIN

CAS Registry Number: 297-97-2

Synonyms: Phosphorothioic Acid, O,O-Diethyl O-Pyrazinyl Ester; AC 18133; ACC 18133; American Cyanamid 18133; CL 18133; Cynem; O,O-Diethyl O-2-Pyrazinyl Phosphorothioate; Diethyl O-2-Pyrazinyl Phosphorothionate; O,O-Diethyl O-2-Pyrazinyl Phosphothionate; O,O-Diethyl O-Pyrazinyl Thiophosphate; EN 18133; ENT 26,680; Ethyl Pyrazinyl Phosphorothioate; Experimental Nematocide 18,133; Nemafos; Nemaphos; Nematocide; Phosphorothioic Acid, O,O-Diethyl O-2-Pyrazinyl Ester; Pyrazinol, O-Ester with O,O-Diethyl Phosphorothioate; Zinophos

Chemical Formula: $C_8H_{13}N_2O_3PS$

Molecular Weight: 248.26

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 3.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 176°F, 80°C at 0.001 mmHg (Hawley 1981, p. 1019)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.003 at 30°C (Merck 1983, p. 1338)

Melting Point: 29°F, -1.7°C (Hawley 1981, p. 1019)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (Hawley 1981, p. 1019), 1140 ppm at 24.8°C (*Spencer 1982)

THIONAZIN

SECTION II (continued)

Appearance and Odor: Amber liquid (Hawley 1981, p. 1019); pure compound is almost colorless liquid and technical product is light brown to tan mobile liquid (*Spencer 1982)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 1019)
Skin: Yes (Hawley 1981, p. 1019)
Ingestion: Yes (Hawley 1981, p. 1019)

Health Hazards (Acute, Delayed, and Chronic): Cholinesterase inhibitor (Hawley 1981, p. 1019). (Non-Specific -- Organic Phosphate Compound, Liquid, Poison B). Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organic Phosphate Compound, Liquid, Poison B). Extinguish with dry chemical, carbon dioxide, water spray, or foam. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55). (Non-Specific -- Parathion) Extinguish fire using agent suitable for type of surrounding fire. Use water in flooding quantities as fog. Use foam, carbon dioxide, or dry chemicals (Student 1981, p. 392).

Special Fire Fighting Procedures: (Non-Specific -- Organic Phosphate Compound, Liquid, Poison B). Keep unnecessary people away; stay upwind; wear positive pressure breathing apparatus and special protective clothing; remove and isolate contaminated clothing (DOT 1984, Guide 55). (Non-Specific -- Organic Phosphate Mixture, Liquid, Poison B). Do not extinguish fire unless flow can be stopped (Student 1981, p. 392). (Non-Specific -- Parathion) Avoid breathing dusts, and fumes from burning materials. Avoid body contact with materials. Wear full protective clothing (Student 1981, p. 392).

THIONAZIN

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organic Phosphate Compound, Liquid, Poison B). This material may burn but does not ignite readily (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: (Non-Specific -- Organic Phosphate Compound, Liquid, Poison B). Fire may produce irritating or poisonous gases (DOT 1984, Guide 55).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used in insecticides, fungicides, and nematocides (Hawley 1981, p. 1019). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organic Phosphate Compound, Liquid, Poison B). Do not touch spilled material; stop leak if possible; use water spray to reduce vapors. Small spill: take up with sand or other noncombustible absorbent material and place into container for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55). (Non-Specific -- Parathion) Avoid breathing vapors. Avoid bodily contact with materials. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 392).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating,

THIONAZIN

SECTION VIII (continued)

chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Parathion). Acute effects include loss of appetite, nausea, vomiting, diarrhea, excessive salivation, pupillary constriction, bronchoconstriction, muscle twitching, convulsions, and coma (Merck 1983, p. 1010).

Emergency and First Aid Procedures: (Non-Specific -- Organic Phosphate Compound, Liquid, Poison B). Move victim to fresh air; 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 (DOT 1984, Guide 55). (Non-Specific -- Organic Phosphate Mixture, Liquid, Poison B). Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 381).

COMMENTS:

Sources searched and no information found:

Hayes 1982
Weast 1979
Sax 1984
Clayton and Clayton 1981-82
NFPA 1984
NIOSH/OSHA 1978

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PARATHION-METHYL

CAS Registry Number: 298-00-0

Synonyms: Phosphorothioic Acid, O,O-Dimethyl O-(p-Nitrophenyl) Ester (Dry Mixture); Methyl Parathion; Azofos; Azophos; BAY 11405; Bladan-M; Dalf; Dimethylfenitrothion; Dimethyl 4-Nitrophenyl Phosphorothionate; Dimethyl p-Nitrophenyl Phosphorothionate; Dimethyl p-Nitrophenyl Thiophosphate; Dimethyl Parathion; E 601; ENT 17,292; Folidol M; Folidol M-40; Gearphos; M-Parathion; Meptox; Metacid 50; Metacide; Metafos; Metafos (Pesticide); Metaphos; Methyl-E 605; Methylthiophos; Metron; Metron (Pesticide); NCI-C02971; Nitrox; Nitrox 80; O,O-Dimethyl O-(p-Nitrophenyl) Phosphorothioate; O,O-Dimethyl O-(p-Nitrophenyl) Thionophosphate; O,O-Dimethyl O-(p-Nitrophenyl) Thiophosphate; Oleovofotox; Parathion Methyl Homolog; Partron M; Penncap M; Penncap MLS; Phenol, p-Nitro-, O-Ester with O,O-Dimethyl Phosphorothioate; Phosphorothioic Acid, O,O-Dimethyl O-(4-Nitrophenyl) Ester; Quinophos; Sinafid M-48; Thiophenit; Vofatox; Wofatox; Wofotox; 8056 HC

Chemical Formula: $C_8H_{10}NO_5PS$

Molecular Weight: 263.23

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.034 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.358 at 20°C (*Merck 1983)

Vapor Pressure (mmHg): 0.0000097 at 20°C (*Worthing 1979)

Melting Point: 99-100°F, 37-38°C (*Merck 1983)

PARATHION-METHYL

SECTION II (continued)

Vapor Density (Air=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 50 mg/liter (*Merck 1983)

Appearance and Odor: White crystalline solid or powder (*NFPA 1978); odor like rotten eggs or garlic (*CHRIS 1978). Commercial product is a liquid consisting of 80 percent methyl parathion and 20 percent xylene (NFPA 1984, pp. 49-64); light to dark tan (*Worthing 1979).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.2 mg/m^3 (skin) (ACGIH 1986-7, p.24)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150-lb. person (*Gosselin 1984). Chronic toxicity does not appear to be a major consideration (*NRC 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not flammable at normal temperatures (*Clayton and Clayton 1982); commercial product, containing xylene, has flashpoint of 115°F (OC) (NFPA 1984, pp. 49-64).
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (*DOT 1984). Wear special protective clothing (*NFPA 1978).

Unusual Fire and Explosion Hazards: Poisonous gases are produced in fire and when heated (*CHRIS 1978). Decomposition may lead to sufficient

PARATHION-METHYL

SECTION IV (continued)

internal pressure to cause the container to rupture violently (NFPA 1984, pp. 49-64).

NFPA Flammability Rating: 1 (solid); 3 (xylene solution)

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: High temperatures (120°F) cause decomposition (NFPA 1984, pp. 49-64).

Incompatibility (Materials to Avoid): Oxidizing materials (NFPA 1984, pp. 49-64).

Hazardous Decomposition or Byproducts: Decomposition may lead to rupture of containers (NFPA 1984, pp. 49-64).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide on over 50 crops, primarily cotton, and on several ornamentals (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent material and place into containers for later disposal. Small dry spills: with clean shovel place material into clean, dry containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PARATHION-METHYL

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PARATHION-METHYL

(298-00-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - White crystalline solid or powder.

Odor - Resembling rotten eggs or garlic.

Commercial Forms - Emulsifiable concentrates, wettable powders, dusts, or light to dark tan liquid consisting of 80% parathion-methyl and 20% xylene.

Use - Insecticide.

Materials to Avoid - Oxidizers.

Other Names - Dalf; Dimethyl parathion; ENT-17,292; Folidol-M; Meptox; Metacide; Metaphos; Metron; Nitrox; Partron M; Penncap M; phosphorothioic acid, O,O-dimethyl O-(p-nitrophenyl)ester; Quinophos; Thiophenit; Vofatox; Wofatox.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Parathion-Methyl Exposure:

Note: Parathion-methyl is a cholinesterase inhibitor.

Acute exposure to parathion-methyl may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) may occur although hypertension (high blood pressure) is not uncommon. Chest pain may be noted. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

PARATHION-METHYL

Emergency Life-Support Procedures:

Acute exposure to parathion-methyl may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to parathion-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to parathion-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

PARATHION-METHYL

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of parathion-methyl is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of parathion-methyl may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHORATE

CAS Registry Number: 298-02-2

Synonyms: Phosphorodithioic Acid, O,O-Diethyl S-(Ethylthio)Methyl Ester; Methanethiol, (Ethylthio)-, S-Ester with O,O-Diethylphosphorodithioate; O,O-Diethyl S-Ethylmercaptomethyl Dithiophosphonate; O,O-Diethyl S-Ethylthiomethyl Dithiophosphonate; O,O-Diethyl S-(Ethylthio)methyl Dithiophosphonate; Experimental Insecticide 3911; L 11/6; Thimet; American Cyanamid 3,911; AC 3911; American Cyanamid 3911; EI 3911; ENT 24,042, ENT 24042; Granutox; O,O-Diethyl Ethylthiomethyl Phosphorodithioate; O,O-Diethyl S-Ethylmercaptomethyl Dithiophosphate; O,O-Diethyl S-Ethylthiomethyl Thiothionophosphate; Phorate 10G; Rampart; Thimet 10G; Timet; Vegfru; Vergfru Foratox; VUAgT 182

Chemical Formula: $C_7H_{17}O_2PS_3$

Molecular Weight: 260.39

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.011 mg/liter for 1 hour (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 257-261°F, 125-127°C at 2 mmHg (*Merck 1983)

Specific Gravity (H_2O=1): 1.156 at 25°C (*Merck 1983)

Vapor Pressure (mmHg): 0.00084 at 20°C (*Merck 1983)

Melting Point: -45°F, -42.9°C (*Spencer 1982)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

PHORATE

SECTION II (continued)

Solubility in Water: 50 mg/liter (*Merck 1983)

Appearance and Odor: Clear liquid (*Merck 1983); objectionable odor (*Osol 1980)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.05 mg/m^3 (skin); STEL 0.2 mg/m^3 (skin) (*ACGIH 1983)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*ACGIH 1980)
Skin: Yes (*ACGIH 1980)
Ingestion: Yes (*ACGIH 1980)

Health Hazards (Acute, Delayed, and Chronic): This material is one of the more toxic organophosphorus insecticides (*Osol 1980). It is a cholinesterase inhibitor that acts on the nervous system, and produces toxicity similar to Parathion. The probable oral lethal dose for humans is less than 5 mg/kg, i.e. a taste (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorous Pesticide) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55)

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorous Pesticide) Wear positive pressure self-contained breathing apparatus. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Shock can shatter containers, releasing the contents. When heated to decomposition, toxic fumes of sulfur oxides, phosphorus oxides, and nitrogen oxides are emitted (Sax 1984, p. 2208).

NFPA Flammability Rating: Not Found

PHORATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Merck 1983)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Hydrolyzed in water and alkalies (*Merck 1983).

Hazardous Decomposition or Byproducts: When heated to decomposition, sulfur oxides, phosphorus oxides, and nitrogen oxides are emitted (Sax 1984, p. 2208)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide and acaricide; it is applied to plants and soil (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

PHORATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHORATE

(298-02-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Clear liquid.

Odor - Objectionable.

Commercial Forms - 2.5, 5, 10, and 20% pure granules.

Use - Pesticide.

Caution: *Phorate will form toxic mixtures of sulfur oxides, phosphorus oxides, and nitrogen oxides when heated to decomposition. Avoid sources of extreme heat.*

Other Names - American Cyanamid 3911, Granutox, Rampart, Thimenox, Thimet, Vegfru, O,O-diethyl S-ethylmercaptomethyl dithiophosphonate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Phorate Exposure:

Note: Phorate is a cholinesterase inhibitor.

Acute exposure to phorate may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

The heart rate may decrease following oral exposure or increase following dermal exposure. Chest pain may be noted. Hypotension (low blood pressure) may occur, although hypertension (high blood pressure) is not uncommon. Dyspnea (shortness of breath) may be followed by respiratory collapse. Giddiness is common.

PHORATE

Emergency Life-Support Procedures:

Acute exposure to phorate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phorate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phorate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

PHORATE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of phorate is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of phorate may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DISULFOTON

CAS Registry Number: 298-04-4

Synonyms: Phosphorodithioic Acid, O,O-Diethyl S-(2-(Ethylthio)Ethyl) Ester; Bay 19639; Bayer 19639; Di-syston; Di-syston G; Dimaz; Disulfaton; Disystox; Dithiodemeton; Dithiosystox; Dution; Ekatin TD; ENT 23,437; ENT-23437; Ethyl Thiometon; Ethylthiometon B; Frumin; Frumin AL; Frumin G; Glebofos; M 74 (Pesticide); M-74; O,O-Diethyl 2-Ethylthioethyl Phosphorodithioate; O,O-Diethyl S-(2-(Ethylthio)Ethyl) Phosphorodithioate; O,O-Diethyl S-(2-Eththioethyl) Phosphorodithioate; O,O-Diethyl S-(2-Eththioethyl)Thiothionophosphate; O,O-Diethyl S-(2-Ethylmercaptoethyl) Dithiophosphate; O,O-Diethyl S-2-(Ethylthio)Ethyl Phosphorodithioate; O,O-Ethyl S-2(Ethylthio)Ethyl Phosphorodithioate; Phosphorodithioic Acid, O,O-Diethyl S-(2-(Ethylthio)Ethyl) Ester; Phosphorodithionic Acid, S-2-(Ethylthio)Ethyl O,O-Diethyl Ester; S 276; S-2-(Ethylthio)Ethyl O,O-Diethyl Ester of Phosphorodithioic Acid; Solvirex; Thiodemeton; Thiodemetron; Vuagt 1-4; Vuagt 1964

Chemical Formula: $C_8H_{19}O_2PS_3$

Molecular Weight: 274.38

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 2 mg/kg (*NIOSH/RTECS 1985).

TPQ: 500 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 270-271°F, 132-133°C at 1.5 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.144 (*Merck 1976)

Vapor Pressure (mmHg): 0.00018 at 20°C (*Spencer 1973)

Melting Point: Greater than -13°F, -25°C (*Sunshine 1969)

DISULFO[illegible]N

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 25 mg/liter at 23°C (*NRC 1977)

Appearance and Odor: Oily, colorless liquid when pure; technical product is dark yellowish oil (*Spencer 1973). It has a characteristic sulfur odor (*Sax 1975).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 mg/m^3 (ACGIH 1986-7, p.18)

IDLH: Not Found

Other Limits Recommended: An airborne limit of 0.1 mg/m^3 should serve to limit general room contamination (*ACGIH 1980).

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. Probable oral lethal dose in humans is less than 5 mg/kg or a taste (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976). It is poisonous and may be fatal if inhaled, swallowed, or absorbed through the skin. Contact may cause burns to skin and eyes (*DOT 1984).

Medical Conditions Generally Aggravated by Exposure: Not found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Material m[illegible] but does not ignite easily. Cylinder may explode in the heat of fire [illegible]ous gases may be generated from the fire or runoff water (DOT [illegible]ide 55).

DISULFOTON

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Oxidizable in air (*Sunshine 1969).

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated poisonous gases may be given off (DOT 1984, Guide 55).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Major uses include insecticide for mites and aphids on small grains, corn, sorghum, cotton, and other field crops, fruits, nuts, and ornamentals (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spill material. Exposure by skin contact is likely to be more significant than inhalation (*ACGIH 1980). Small spills: take up with sand or other noncombustible absorbent materials and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

DISULFOTON

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DISULFOTON

(298-04-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Oily brown, yellow, or colorless liquid.

Odor - Pure compound has characteristic sulfur odor, commercial form has aromatic odor.

Commercial Forms - Granules, powder, emulsifiable concentrate, dark yellow oil.

Use - Pesticide.

Caution: *Containers may explode when exposed to high temperatures. Toxic gases may be liberated. Avoid sources of extreme heat.*

Other Names - Di-syston, disystox, Dithiosystox, Dution, Frumin, Glebofos, Solvirex, Thiodemeton, O,O-diethyl S-2-(ethylthio)ethyl phosphorodithioate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Disulfoton Exposure:

Note: Disulfoton is a cholinesterase inhibitor.

Acute exposure to disulfoton may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) and chest pain may be noted. Hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

DISULFOTON

Emergency Life-Support Procedures:

Acute exposure to disulfoton may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to disulfoton.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to disulfoton.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

DISULFOTON

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of disulfoton is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of disulfoton may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- AMPHETAMINE

CAS Registry Number: 300-62-9

Synonyms: Phenethylamine, alpha-Methyl; (+-)-alpha-Methylbenzene- ethanamine; (+-)-alpha-Methyl Phenethylamine; (+-)-alpha-Methylphenyl ethylamine; (+-)-beta-Phenylisopropylamine; (+-)-Desoxynorephedrine; (Phenylisopropyl)amine; 1-Phenyl-2-aminopropane; Acetedron; Adipan; Allodene; Anorexide; Anorexine; Benzebar; Benzedrine; Benzeneethanamine, alpha-Methyl-, (+-); Benzolone; beta-Aminopropylbenzene; DL-1-Phenyl-2-Aminopropane; DL-alpha-Methylphenethylamine; DL-Amphetamine; DL-Benzedrine; Elastonon; Finam; Isoamyne; Isomyn; Mecodrin; Norephedrane; Norephedrine, deoxy-; Novydrine; Oktedrin; Ortedrine; Percomon; Phenedrine; Profamina; Propisamine; Psychedrine; Racemic desoxy-nor-ephedrine; Raphetamine; Rhinalator; Simpatedrin; Simpatina; Sympamine; Sympatedrine; Weckamine

Chemical Formula: $C_9H_{13}N$

Molecular Weight: 135.20

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 22mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 392-397°F, 200-203°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.913 at 25°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): 4.65 (Sax 1984, p. 271)

AMPHETAMINE

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Evaporates slowly at room temperature (*Merck 1976).

Solubility in Water: Slightly soluble (*Merck 1976).

Appearance and Odor: Colored liquid; amine odor (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Not Found
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): It is classified as extremely hazardous. Probable lethal dose in humans is 5-50 mg/kg or 7 drops to 1 teaspoon for a 70 kg (150 lb.) person (*Gosselin 1976). Habit forming drug which affects the central nervous system (Hawley 1981, p. 65).

Medical Conditions Generally Aggravated by Exposure: Excessive use may lead to tolerance and physical dependence (*Merck 1976). Death is possible (Gosselin 1976, p. II-369).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 80°F, 26.6°C (no method given) (Hawley 1981, p. 65)

Flammable Limits: It is flammable (Hawley 1981, p. 65)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with carbon dioxide or dry chemical (*Sax 1975).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Dangerous when exposed to heat or flames (*Sax 1975).

NFPA Flammability Rating: Not Found

AMPHETAMINE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Can react with oxidizing materials (*Sax 1975).

Hazardous Decomposition or Byproducts: Upon decomposition, nitrogen oxides are emitted (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Amphetamine is used as a pharmaceutical (Hawley 1981, p. 65). It is a central nervous system stimulant (*Rossoff 1974).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Drugs, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 11).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Nitrile	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

AMPHETAMINE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Dry mouth, metallic taste, loss of appetite, nausea, vomiting, diarrhea, abdominal cramps, headache, chilliness, flushing or pallor, palpitation, restlessness, dizziness, tremor, hyperactive reflexes, talkativeness, tenseness, irritability, weakness, insomnia, fever, confusion. With large doses, irregular heartbeat, pain and difficulty in urination (*Goodman 1975). Convulsions, coma, circulatory collapse (Gosselin 1976, p. II-369).

Emergency and First Aid Procedures: (Non-Specific -- Drugs, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 11).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDRAZINE

CAS Registry Number: 302-01-2

Synonyms: Diamine; Hydrazine Anhydrous; Hydrazine Base; Hydrazine, Anhydrous; Levoxine

Chemical Formula: H_4N_2

Molecular Weight: 32.05

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.33 mg/Liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 236.3°F, 113.5°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.011 at 15°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 14.4 at 25°C (*Sunshine 1969)

Melting Point: 36°F, 2.0°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Merck 1983)

Appearance and Odor: Colorless, oily liquid with penetrating ammonia-like odor (*Merck 1983).

HYDRAZINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 ppm (1.3 mg/m^3) (NIOSH 1987, p.136)

ACGIH TLV: TWA 0.1 ppm (0.1 mg/m^3) (skin) (ACGIH 1986-87, p.20)

IDLH: 80 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: Short-term inhalation limits - 1 ppm for 30 minutes (Weiss 1980, p. 509); Occupational Exposure to Hydrazines Recommended Standard Air Ceiling 0.04 mg/m^3/2 hours (*NIOSH/RTECS 1985). Industrial Substance Suspect of Carcinogenic Potential for Humans -- Recommended TLV 0.1 ppm (skin) (ACGIH 1984, p. 42). NIOSH: 0.04 mg/m^3 120-minute ceiling (NIOSH 1987, p.136). SPEGL 0.12 ppm (60 minutes) (NRC 1985b, pp. 5-22).

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 110)
Skin: Yes (NIOSH/OSHA 1978, p. 110)
Ingestion: Yes (NIOSH/OSHA 1978, p. 110)

Health Hazards (Acute, Delayed, and Chronic): Target organs affected include central nervous system; respiratory system; skin and eyes (NIOSH/OSHA 1978, p. 110). Chronic exposure in humans may cause pneumonia, liver and kidney damage. Liver damage may be more severe than kidney damage (Gosselin 1976, p. II-247). It is a suspected human carcinogen (ACGIH 1984, p. 42).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 52°C (*Merck 1983)
Flammable Limits:
LEL: 4.7% (*NFPA 1978)
UEL: 100% (*NFPA 1978)

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and protective clothing. Isolate for one-half mile in all directions if tank car or truck is involved in fire. Move container from fire area if you can do so without risk. Dike fire control water for later disposal; do not scatter material. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: It is a flammable/combustible material and may be ignited by heat, sparks, or flames. Vapor may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors, or in sewers.

HYDRAZINE

SECTION IV (continued)

Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 28). Vapors form explosive mixtures with air (NFPA 1984, pp. 49-52). May continue to burn in the absence of air (*Bretherick 1979).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Can catch fire when in contact with porous materials such as wood, asbestos, cloth, earth, and rusty metals (Weiss 1980, p. 509). Incompatible with oxidizers, hydrogen peroxide, nitric acid, metal oxides, and strong acids (NIOSH/OSHA 1978, p. 110).

Hazardous Decomposition or Byproducts: Decomposition gives off toxic nitrogen compound fumes (*Rumack 1975 to Present).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 509)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate for pesticides, blowing agents, photography chemicals, pharmaceuticals, antituberculants, textile dyes (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation of vapors (see Section III above). Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 28).

HYDRAZINE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
CPE	POOR/LIMITED*
Chlorobutyl	GOOD/LIMITED
Neoprene	GOOD/LIMITED
Nitrile	GOOD/LIMITED
PVC	GOOD/LIMITED
Teflon	POOR/LIMITED
Viton	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for HYDRAZINE

(302-01-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless, fuming, oily liquid.

Odor - Penetrating, ammonialike.

Commercial Form - 97.5% pure liquid in glass bottles, carboys, stainless steel cans, drums, tank trucks.

Uses - Chemical intermediate, antioxidant, heat stabilizer, corrosion inhibitor, nickel plating, chain extender in polymerization, component of rocket fuel, military applications.

Materials to Avoid - Porous materials, oxidizers, acids, water (except for use in emergency life support).

Caution: *Highly flammable and explosive. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Hydrazine anhydrous, Levoxine.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, pyridoxine, phenytoin, phenobarbital.

Signs and Symptoms of Acute Hydrazine Exposure:

Warning: *Effects may be delayed for hours to days. Caution is advised.*

HYDRAZINE

Signs and symptoms of acute exposure to hydrazine may include severe eye irritation, facial numbness, facial swelling, and increased salivation. Hydrazine vapor may immediately irritate the nose and throat. Headache, twitching, seizures, convulsions, and coma may also occur. Gastrointestinal signs and symptoms include anorexia, nausea, and vomiting. Pulmonary edema and hypotension (low blood pressure) are common. Hydrazine is toxic to the liver, ruptures red blood cells, and may cause kidney damage. Dermal contact may result in irritation or severe burns.

Emergency Life-Support Procedures:

Acute exposure to hydrazine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrazine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydrazine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

HYDRAZINE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ALDRIN

CAS Registry Number: 309-00-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 113) 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-; Aldrex; Aldrite; Aldrosol; Aldrin, Cast Solid; Aldrin Mixture, Dry; Aldrin Mixture, Liquid; Compound 118; Drinox; ENT 15,949; Hexachlorohexahydro-endo-exo-Dimethanonaphthalene; 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-1,4,5,8-Dimethanonaphthalene; 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-exo-1,4-endo-5,8-Dimethanonaphthalene; 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-1,4-endo-exo-5,8-Dimethanonaphthalene; HHDN; NCI-C00044; Octalene; Seedrin; 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-, (1 alpha, 4 alpha, 4a beta, 5 alpha, 8 alpha, 8a beta)-

Chemical Formula: $C_{12}H_8Cl_6$

Molecular Weight: 364.90

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 293°F, 145°C at 2 mmHg (Hayes 1982, p. 234); decomposes (NIOSH/OSHA 1978, p. 42)

Specific Gravity (H_2O=1): 1.70 at 20°C (Hayes 1982, p. 234)

Vapor Pressure (mmHg): 0.000006 at 25°C (Hayes 1982, p. 234)

Melting Point: (Pure) 219°F, 104°C; (Technical) 120-140°F, 49-60°C (Hayes 1982, p. 234)

ALDRIN

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.027 mg/liter (Hayes 1982, p. 234)

Appearance and Odor: (Pure) Odorless, white solid. (Technical) Tan to dark brown solid with a mild "chemical" odor (Hayes 1982, p. 234).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.25 mg/m^3 (NIOSH/OSHA 1978, p. 42)

ACGIH TLV: 0.25 mg/m^3 (skin) (ACGIH 1986-87, p. 9)

IDLH: 100 mg/m^3 (NIOSH/OSHA 1978, p. 42)

Other Limits Recommended: NIOSH: Lowest detectable limit (NIOSH 1987, p. 46)

Routes of Entry: **Inhalation:** Yes (NIOSH 1978, p. 42)
Skin: Yes (NIOSH 1978, p. 42)
Ingestion: Yes (NIOSH 1978, p. 42)

Health Hazards (Acute, Delayed, and Chronic): Poisoning by aldrin usually involves convulsions due to its effects on the central nervous system. Reproductive effects and liver effects have also been reported (Doull 1980, p. 383; Hayes 1982, p. 235). It is classified as an extremely toxic chemical. Probable oral lethal dose for humans is between 7 drops and one oz. for a 150 lb. adult human (Gosselin 1976, p. 186). Conflicting reports of carcinogenicity of this compound remain an area of controversy (Doull 1980, p. 383). Similar chemically and toxicologically to dieldrin (Gosselin 1984, p. II-285).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Approximately 150°F or higher (no method given) (NFPA 1984, p. 49-13)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Flammable (Hayes 1982, p. 234). Extinguish by using water spray, dry chemical, foam, or carbon dioxide. Use water to keep fire-exposed containers cool. Use water spray to disperse the vapors (NFPA 1984, p. 49-13).

ALDRIN

SECTION IV (continued)

Special Fire Fighting Procedures: Wear full protective clothing (NFPA 1984, p. 49-13) including positive pressure breathing apparatus. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of chlorine containing compounds (Sax 1984, p. 153). Commercial solutions may contain flammable or combustible liquids. The dry powder will not burn (NFPA 1984, p. 49-13). Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: 1 (solution); 0 (dry)

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Avoid concentrated mineral acids, acid catalysts, acid oxidizing agents, phenols, or active metals (Hayes 1982, p. 234).

Hazardous Decomposition or Byproducts: When heated to decomposition it emits toxic fumes of chlorine containing compounds (Sax 1984, p. 153).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Formerly used as an insecticide; manufacture and use have been discontinued in the USA (Merck 1983, p. 36). Registered as a termicide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

ALDRIN

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED**
Butyl/Neoprene	POOR/LIMITED**
CPE	POOR/LIMITED**
Neoprene	POOR/LIMITED**
Nitrile	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ALDRIN

(309-00-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless or white crystalline solid.

Odor - None (mild chemical odor in commercial form).

Commercial Forms - Tan to dark brown emulsifiable concentrate, wettable powders, granules, or dusts in 1- and 5-gallon cans or 45-gallon fiber drums.

Use - Insecticide.

Other Names - Aldrite; Aldrosol; Drinox; HHDN; 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-exo-1,4-endo-5,8-dimethanonaphthalene; Octalene; Seedrin.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, alcohol, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, D5W, normal saline, Ringer's lactate, diazepam, phenytoin, phenobarbital, thiopental, succinylcholine.

Signs and Symptoms of Acute Aldrin Exposure:

Signs and symptoms of acute exposure to aldrin may be severe and include headache, dizziness, agitation, nervousness, tremor, seizures, and coma. Convulsive episodes may alternate with periods of severe central nervous system depression. Nausea, vomiting, and diarrhea are common.

Hypertension (high blood pressure), tachycardia (rapid heart rate), and cardiac arrhythmias (abnormal heart beating) may be noted. Respiratory depression may lead to respiratory arrest. Contact with the skin, eyes, and mucous membranes may result in redness and irritation. Victims often have an elevated temperature.

ALDRIN

Emergency Life-Support Procedures:

Acute exposure to aldrin may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to aldrin.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to aldrin.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times. Wash initially with soap and water, follow with an alcohol wash, then again with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

ALDRIN

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of aldrin is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of aldrin may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MEXACARBATE

CAS Registry Number: 315-18-4

Synonyms: Carbamic Acid, Methyl-, 4-Dimethylamino-3,5-xylyl Ester; Zectran; 3,5-Dimethyl-4-(Dimethylamino)Phenyl Methylcarbamate; 3,5-Xylenol, 4-(Dimethylamino)-, Methylcarbamate; 4-(Dimethylamino)-3,5-Xylyl N-Methylcarbamate; 4-(Dimethylamino)-3,5-Dimethylphenol Methylcarbamate (Ester); 4-(Dimethylamino)-3,5-Dimethylphenyl N-Methylcarbamate; 4-(Dimethylamino)-3,5-Xylenol, Methylcarbamate (Ester); 4-(N,N-Dimethylamino)-3,5-Xylyl N-Methylcarbamate; 4-Dimethylamino-3,5-Dimethylphenyl Methylcarbamate; 4-Dimethylamino-3,5-Dimethylphenyl N-Methylcarbamate; 4-Dimethylamino-3,5-Xylenyl N-Methylcarbamate; 4-Dimethylamino-3,5-Xylyl Methylcarbamate; 4-Dimethylamino-3,5-Xylyl N-Methylcarbamate; Carbamate, 4-Dimethylamino-3,5-Xylyl, N-Methyl-; Carbamic Acid, Methyl-, 4-(Dimethylamino)-3,5-Dimethylphenyl Ester; Carbamic Acid, Methyl-, 4-(Dimethylamino)-3,5-Xylyl Ester; Dowco 139; Dowco-139; ENT 25,766; ENT 25766; ENT-25,766; MAZ; Methyl-4- Dimethylamino-3,5-Xylyl Carbamate; Methyl-4-Dimethylamino-3,5-Xylyl Ester of Carbamic Acid; Methylcarbamic Acid 4-(Dimethylamino)-3,5-Xylyl Ester; Mexicarbate; NCI-C00544; OMS-47; Phenol, 4-(Dimethylamino)-3,5-Dimethyl-, Methylcarbamate (Ester); Zactran; Zectane; Zextran; Phenol, 4-(Dimethylamino)- 3,5-Dimethyl-, Methylcarbamate (Ester)

Chemical Formula: $C_{12}H_{18}N_2O_2$

Molecular Weight: 222.29

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 14 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

MEXACARBATE

SECTION II (continued)

Vapor Pressure (mmHg): Less than 0.1 at 139°C (*Merck 1983)

Melting Point: 185°F, 85°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.01% at 25°C (*Merck 1983)

Appearance and Odor: White crystalline solid, odorless (*Martin 1974)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Carbamate Pesticide, Solid, n.o.s) (DOT 1984, Guide 55)
Skin: Yes (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) (DOT 1984, Guide 55)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic: probable oral lethal dose for humans is 5-50 mg/kg; between 7 drops and 1 teaspoonful for 70 kg person (150 lb.) (*Gosselin 1976). (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Poisonous; may be fatal if inhaled, swallowed, or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Not Found

MEXACARBATE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Fire may produce irritating or poisonous gases. This material may burn but does not ignite readily. Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Martin 1974)

Conditions to Avoid: Subject to photo-decomposition in the solid state (*IARC 1972-1985).

Incompatibility (Materials to Avoid): Decomposition in highly alkaline media (*Martin 1974).

Hazardous Decomposition or Byproducts: When heated to decomposition it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1108).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is an insecticide for non-agricultural uses, e.g., lawn and turf, flowers, gardens, vines, forest lands, woody shrubs and trees and also a molluscicide. It is not produced commercially in the United States (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide) Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewer. Avoid bodily contact with the material (Student 1981, p. 104).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

MEXACARBATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms of carbamate poisoning resemble those of parathion. This material is similar to carbaryl; symptoms of carbaryl exposure include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, sweating, lassitude and weakness. Runny nose and sensation of tightness in chest may occur with inhalation exposures. Blurring or dimness of vision, tearing, eye muscle spasm, loss of muscle coordination, slurring of speech, and twitching of muscles may also occur (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- EMETINE, DIHYDROCHLORIDE

CAS Registry Number: 316-42-7

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 192) Amebicide; (-)-Emetine Dihydrochloride; l-Emetine Dihydrochloride; Emetine, Hydrochloride; NSC-33669

Chemical Formula: $C_{29}H_{40}N_2O_4 \cdot 2HCl$

Molecular Weight: 553.63

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 0.012 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 455-491°F, 235-255°C decomposes (Merck 1983, p. 514)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Contains water of hydration varying from 3 to 8 molecules of water; 1 g of hydrated salt dissolves in 7 mL (Merck 1983, p. 514)

EMETINE, DIHYDROCHLORIDE

SECTION II (continued)

Appearance and Odor: Clusters of needles after drying at 221°F, 105°C; turns yellow on exposure to light or heat ((Merck 1983, p. 514)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1275)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic orally. It is an eye irritant (Sax 1984, p. 1275). (Non-Specific -- Emetine) Emetine is classified as extremely toxic. Probable oral lethal dose for humans is 5-50 mg/kg, or between 7 drops and one teaspoon for a 150-lb person (Gosselin 1984, p. II-244).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Emetine is an alkaloid (Merck 1983, p. 513). Extinguishing methods for alkaloid salts are as follows. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Procedures for alkaloid salts include the following. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of chlorides, hydrogen chloride and oxides of nitrogen (Sax 1984, p. 1275).

NFPA Flammability Rating: Not Found

EMETINE, DIHYDROCHLORIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Turns yellow on exposure to light or heat (Merck 1983, p. 514)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of chlorides, hydrogen chloride, and oxides of nitrogen (Sax 1984, p. 1275).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Emetine, dihydrochloride is an injectable form of emetine (Gilman 1984, p. 1051). It is an antiamebic (Merck 1983, p. 514). Emetine is the active ingredient of Ipecac (Gosselin 1984, p. II-244).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

The following procedures should be used for alkaloid salts. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

EMETINE, DIHYDROCHLORIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Emetine) Symptoms include nausea, vomiting, diarrhea, muscle weakness, pain, tenderness, hypotension, precordial pain and rapid heartbeat (Gosselin 1984, p. II-244).

Emergency and First Aid Procedures: Emetine is an alkaloid (Merck 1983, p. 513). Procedures for alkaloid salts are as follows. Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS:

Sources searched but no information found:

NFPA 1984
Weiss 1980
ACGIH 1983
NIOSH/OSHA 1978
Encyc Occupat Health and Safety 1983
Weast 1979
Physicians' Desk Reference 1985
Farm Chemicals Handbook 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRICHLORONATE

CAS Registry Number: 327-98-0

Synonyms: 5082A; Agrisil; Agritox; Bay 37289; Bayer 37289; Bayer 5081; Bayer S 4400; Chemagro 37289; ENT 25,712; ENT-25712; Ethyl Trichlorophenylethylphosphonothioate; Fenophosphon; Fitosol; O-Ethyl O-2,4,5-Trichlorophenyl Ethylphosphonothioate; Phenol, 2,4,5-Trichloro-, O-Ester with O-Ethyl Ethylphosphonothioate; Phosphonothioic Acid, Ethyl-, O-Ethyl O-(2,4,5-Trichlorophenyl) Ester; Phytosol; Richloronate; S 4400; Trichloronat

Chemical Formula: $C_{10}H_{12}Cl_3O_2PS$

Molecular Weight: 333.60

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 226°F, 108°C at 0.01 mmHg (*Worthing 1979)

Specific Gravity (H_2O=1): 1.365 at 20°C/4°C (*Worthing 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 50 mg/liter at 20°C (*Worthing 1979)

TRICHLORONATE

SECTION II (continued)

Appearance and Odor: Amber colored liquid (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organic Phosphorus Pesticides) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organic Phosphorus Pesticides) (Hayes 1982, p. 301)
Ingestion: Yes (Sax 1984, p. 1397)

Health Hazards (Acute, Delayed, and Chronic): Material is an organophosphate (*Rumack 1975 to Present) and toxic effects are due to action on the nervous system (Hayes 1982, p. 301). It has high oral toxicity (Sax 1984, p. 1397) and death can occur in acute poisonings (*DeReuch 1979). Delayed neurotoxicity has been reported (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphate Pesticide, Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphate Pesticide, Liquid, n.o.s.) Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of chlorine containing compounds, phosphorus oxides, and sulfur oxides (Sax 1984, p. 1397).

NFPA Flammability Rating: Not Found

TRICHLORONATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits very toxic fumes of chlorine containing compounds, phosphorus oxides, and sulfur oxides (Sax 1984, p. 1397).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Non-systemic insecticide (*Worthing 1979). Not marketed in the U.S.A. or Canada (Farm Chemicals Handbook 1984, p. C-7). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). (Non-Specific -- Organophosphate Pesticide, Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

TRICHLORONATE

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Headache, dizziness, nausea, salivation, vomiting, abdominal pain, diarrhea, chest pain, decreased heart rate, excessive discharge of mucous from the air passages, difficult breathing, contraction of the pupil, blurred vision, profuse perspiration, muscle twitching and spasms, profound weakness, psychotic behavior, uncoordination, unconsciousness, rarely convulsions. Low level absorption syndrome is similar to influenza. High dosage may cause toxic psychosis similar to alcoholism. Exposures may be misdiagnosed as asthma and heart failure (*Rumack 1975 to Present).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphate Pesticide, Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BORON TRIFLUORIDE COMPOUND WITH METHYL ETHER (1:1)

CAS Registry Number: 353-42-4

Synonyms: (NIOSH/RTECS 1983 Synonym, Volume 1, p. 741) Boron, Trifluoro(Oxybis(methane))-,(T-4)-; Boron Trifluoride-Dimethyl Ether; (SANSS 1983 Synonyms): Methyl Ether, compound with Boron Fluoride (1:1); Boron Fluoride Complex with Dimethyl Ether; Boron Trifluoride Compound with Methyl Ether; Boron Trifluoride Dimethyl Ether Addition Compound; Boron Trifluoride Dimethyl Etherate; Boron Trifluoride Dimethyl Ether Complex

Chemical Formula: $C_2H_6O \cdot BF_3$

Molecular Weight: 113.89

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (guinea pig) 0.233 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 126°C at 760 mmHg (Aldrich 1986, p. 190)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

BORON TRIFLUORIDE COMPOUND WITH METHYL ETHER (1:1)

SECTION II (continued)

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 515)
Skin: Yes (DOT 1984, Guide 29)
Ingestion: Yes (Non-Specific -- Boron Compounds) (Sax 1984, p. 513)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by inhalation (Sax 1984, p. 515).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material may react violently with water. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Wear self-contained, positive- pressure breathing apparatus and full protective clothing. Move containers from fire area if possible. Do not get water inside containers. Spray cooling water on containers that are exposed to flame until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases. Flammable/combustible material which may be ignited by heat spark or flame. 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 sewer. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 29).

NFPA Flammability Rating: Not Found

BORON TRIFLUORIDE COMPOUND WITH METHYL ETHER (1:1)

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of fluorides (Sax 1984, p. 515).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away and isolate hazard area. Stay upwind and keep out of low areas. Shut off ignition sources. Do not touch spilled material. Use water spray to reduce vapors, but do not get water inside containers. For small spills, absorb with sand or other noncombustible absorbent material and place into containers. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Contact may cause burns to skin and eyes (DOT 1984, Guide 29).

Emergency and First Aid Procedures: Move victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing at site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 29).

BORON TRIFLUORIDE COMPOUND WITH METHYL ETHER (1:1)

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FLUOROACETYL CHLORIDE

CAS Registry Number: 359-06-8

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 252): Acetyl Chloride, Fluoro-; TL 670

Chemical Formula: C_2H_2ClFO

Molecular Weight: 96.49

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (guinea pig) 0.1 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

FLUOROACETYL CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1430)
Skin: Not Found
Ingestion: Yes (Non-Specific -- Chloroacetyl Chloride) (NFPA 1984, p. 49-29)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic by inhalation (Sax 1984, p. 1430). (Non-Specific -- Chloroacetyl Chloride) Corrosive to skin and irritating to eyes (NFPA 1984, p. 49-29).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Chloroacetyl Chloride and Fluoroacetic Acid) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 59).

Special Fire Fighting Procedures: (Non-Specific -- Chloroacetyl Chloride and Fluoroacetic Acid) Spray cooling water on containers that are exposed to flames until well after fire is out. Move container from fire area if you can do so without risk. Do not get water in container, as material may react violently with water (DOT 1984, Guide 59).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of chlorine and fluorine-containing compounds (Sax 1984, p. 1430). (Non-Specific -- Chloroacetyl Chloride and Fluoroacetic Acid) Some of these materials may ignite combustibles (i.e., wood, paper, oil, etc.) or react violently with water (DOT 1984, Guide 59).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

FLUOROACETYL CHLORIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of chlorine and fluorine-containing compounds (Sax 1984, p. 1430).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Chloroacetyl Chloride and Fluoroacetic Acid) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors (may react violently with water). Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 59).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Chloroacetyl Chloride and Fluoroacetic Acid) Move victim to fresh air; 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 site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 59).

FLUOROACETYL CHLORIDE

COMMENTS

Sources searched but no information found:

Weast 1979
Hawley 1981
Hayes 1982
DASE 1980
ACGIH 1983
NIOSH/OSHA 1978
Merck 1983
Gilman 1985
Gosselin 1984
Weiss 1980
Clayton and Clayton 1981-82
Farm Chemicals Handbook 1984
Doull 1980
Buchel 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHYLENE FLUOROHYDRIN

CAS Registry Number: 371-62-0

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 252): Ethanol, 2-Fluoro-; beta-Fluoroethanol; 2-Fluoroethanol; TL 741

Chemical Formula: C_2H_5FO

Molecular Weight: 64.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (dog) 0.007 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 218.3°F, 103.5°C (Weast 1979, p. C-297)

Specific Gravity (H_2O=1): 1.1040 at 20°C/4°C (Weast 1979, p. C-297)

Vapor Pressure (mmHg): Not Found

Melting Point: -15.61°F, -26.45°C (Weast 1979, p. C-297)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (Weast 1979, p. C-297)

Appearance and Odor: Liquid (Hayes 1983, p. 500)

ETHYLE... FLUOROHYDRIN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1437)
Skin: Yes (Sax 1984, p. 1437)
Ingestion: Yes (Hayes 1982, p. 500)

Health Hazards (Acute, Delayed, and Chronic): Toxicity rating is the same as for fluoroacetate, super toxic. The probable oral lethal dose in humans is a taste (less than 7 drops) for a 70 kg (150 lb.) person (Gosselin 1984, p. II-198). The chemical is highly toxic when inhaled or absorbed through the skin (Sax 1984, p. 1437). Toxicity depends on its oxidation to fluoroacetate by tissue alcohol dehydrogenase (Hayes 1982, p. 500).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 31°C (Hayes 1982, p. 500)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Toxic fluoride fumes may be emitted in a fire (Sax 1984, p. 1437).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of fluorides (Sax 1984, p. 1437).

ETHYLENE FLUOROHYDRIN

SECTION V (continued)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Ethylene Fluorohydrin is used as a rodenticide (Hayes 1982, p. 500), insectide (Gosselin 1984, p. III-193), and acaricide (Buchel 1983, p. 177). Not registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). (Non-Specific -- Fluoroacetic Acid) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 59).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
CPE	GOOD/LIMITED**
Viton	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include tremors, severe muscular weakness, nausea, headache, and slight swelling of the liver (Hayes 1982, p. 500). Delayed convulsant (Gosselin 1984, p. II-198).

ETHYLENE FLUOROHYDRIN

SECTION IX (continued)

Emergency and First Aid Procedures: Acute poisoning should be treated like poisoning by fluoroacetate. Ethylene fluorohydrin (2-fluoroethanol) is listed among the organic fluorine derivatives of fluoroacetic acid (Hayes 1982, p. 501). The emergency procedures for fluoroacetic acid are: move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 59).

COMMENTS

Sources searched but no information found:

Student 1981
DASE 1980
Hawley 1981
NFPA 1984
Weiss 1980
Merck 1983
CHRIS 1978
Farm Chemicals Handbook 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ERGOTAMINE TARTRATE

CAS Registry Number: 379-79-3

Synonyms: (SANSS 1983 Synonyms) Ergotamine Bitartrate; Gotamine Tartrate; Gynergen; Neo-ergotin; Ergotaman-3',6',18-Trione, 12'-Hydroxy-2'-Methyl-5'-(Phenylmethyl)-, (5'.alpha.)-, [R-(R*,R*)]-2,3-Dihydroxybutanedioate (2:1) (Salt); Ergam; Ergate; Ergomar; Etin; Exmigra; Rigetamin; Secagyn; Secupan; Ergotamine, Tartrate (2:1)(Salt); Component of Cafergot

Chemical Formula: $C_{66}H_{70}N_{10}O_{10}{\cdot}C_4H_6O_6$

Molecular Weight: 1313.56

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat,rabbit) 1 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 397°F, 203°C, decomposes (Merck 1983, p. 529)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g/500 mL (Merck 1983, p. 529)

ERGOTAMINE TARTRATE

SECTION II (continued)

Appearance and Odor: Powder or liquid forms available as drugs (Gilman 1985, p. 938).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Gilman 1985, p. 938)
Skin: Not Found
Ingestion: Yes (NIOSH/RTECS 1983, p. 209)

Health Hazards (Acute, Delayed, and Chronic): High oral toxicity and a convulsant in humans (Sax 1984, p. 1295).

Medical Conditions Generally Aggravated by Exposure: People with liver damage are at a greater risk (Gilman 1985, p. 937).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Protect from light and heat (Merck 1983, p. 529)

Hazardous Decomposition or Byproducts: When [illegible] to decomposition, it emits toxic fumes of nitrogen oxides (Sax 198[illegible]).

ERGOTAMINE TARTRATE

SECTION V (continued)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

The major uses of the ergot alkaloids fall into two categories: applications in obstetrics and treatment of migraine headaches (Gilman 1985, p. 937).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Alkaloid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Use water vapor to reduce vapors. Absorb spills with sand or other noncombustible absorbent material. Small dry spills: with clean shovel place material into clean, dry container and cover; move containers from spill area. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Nausea and vomiting occur in some patients after oral administration. Weakness in the legs is common and muscle pains in the extremities may occur. Numbness and tingling of the fingers and toes may also occur (Gilman 1985, p. 938).

Emergency and First Aid Procedures: (Non-Specific -- Alkaloid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISODRIN

CAS Registry Number: 465-73-6

Synonyms: 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-, endo,endo-; Compound 711; ENT 19,244; Experimental Insecticide 711; 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-1,4; 5,8-endo,endo-Dimethanonaphthalene; 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-endo,endo-1,4:5,8-Dimethanonaphthalene; 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-, (1 alpha, 4 alpha, 4a beta, 5 beta, 8 beta, 8a beta)-; SD 3418

Chemical Formula: $C_{12}H_8Cl_6$

Molecular Weight: 364.90

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 464-468°F, 240-242°C (Sax 1984, p. 1641)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

ISODRIN

SECTION II (continued)

Appearance and Odor: Solid (*Hawley 1977)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Aldrin) (Sax 1984, p. 153)
Skin: Yes (Sax 1984, p. 1641)
Ingestion: Yes (Sax 1984, p. 1641)

Health Hazards (Acute, Delayed, and Chronic): It is classified as extremely toxic. Probable oral lethal dose for humans is 5-50 mg/kg or between 7 drops and 1 teaspoonful for a 70 kg (150 lb.) person. It causes renal damage and hyperactivity of sympathetic nervous system (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Material is related to aldrin (*Gosselin 1976). (Non-Specific -- Aldrin) Extinguish by using water spray, dry chemical, foam, or carbon dioxide. Use water to keep fire exposed containers cool (NFPA 1984, p. 49-13).

Special Fire Fighting Procedures: (Non-Specific -- Aldrin) Wear full protective clothing (NFPA 1984, p. 49-13) including positive pressure breathing apparatus. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Aldrin) This material may burn but may not ignite readily. Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

ISODRIN

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*White-Stevens 1971)
Stable:

Conditions to Avoid: Reactions induced by light or acid (*White-Stevens 1971)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Material is related to aldrin (*Gosselin 1976). (Non-Specific -- Aldrin) When heated to decomposition it emits toxic fumes of chlorine (Sax 1984, p. 153).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

No longer used as a pesticide (*NIOSH/RTECS 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Material is related to aldrin (*Gosselin 1976). (Non-Specific -- Aldrin) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. 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 containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms experienced are similar to poisoning by dieldrin and aldrin, including overall discomfort, headache, nausea, vomiting, dizziness, tremors, convulsions, rise in blood pressure, fever, disturbances in sleep and behavior, and rapid heartbeat. Death from respiratory arrest may occur in coma (*Gosselin 1976, *Merck 1976).

ISODRIN

SECTION IX (continued)

Emergency and First Aid Procedures: Procedures are similar to those for dieldrin and aldrin poisoning (*Gosselin 1976). Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLORFENVINFOS

CAS Registry Number: 470-90-6

Synonyms: Supona; 2,4-Dichloro-alpha-(Chloromethylene)Benzyl Diethyl Phosphate; 2-Chloro-1-(2,4-Dichlorophenyl)Ethenyl Diethyl Ester Phosphoric Acid; 2-Chloro-1-(2,4-Dichlorophenyl)Vinyl Diethyl Phosphate; 4072; Benzyl Alcohol, 2,4-Dichloro-alpha-(Chloromethylene)-, Diethyl Phosphate; beta-2-Chloro-1-(2',4'-Dichlorophenyl)Vinyl Diethyl Phosphate; Birlan; Birlane; C8949; Chlofenvinphos; Chlorofenvinphos; Chlorphenvinfos; Chlorphenvinphos; Compund 4072; CVP; CVP (Pesticide); Dermaton; Diethyl 1-(2,4-Dichlorophenyl)-2-Chlorovinyl Phosphate; Diethyl 2-Chloro-1-(2,4-Dichlorophenyl)Vinyl Phosphate; ENT 24969; GC 4072; GS 4072; OMS 1328; Phosphoric Acid, 2-Chloro-1-(2,4-Dichlorophenyl)Ethenyl Diethyl Ester; Phosphoric Acid, 2-Chloro-1-(2,4-Dichlorophenyl)Vinyl Diethyl Ester; Sapecron; SD 4072; Shell 4072; Supone; Vinyphate

Chemical Formula: $C_{12}H_{14}Cl_3O_4P$

Molecular Weight: 359.56

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 333-338°F, 167-170°C at 0.5 mmHg (*Worthing 1979)

Specific Gravity (H_2O=1): 1.36 at 15.5°C/16.5°C (*Worthing 1979)

Vapor Pressure (mmHg): 0.000004 at 20°C (*Worthing 1979)

Melting Point: -2 to -9°F; -19 to -23°C (*Worthing 1979)

CHLOROENVINFOS

SECTION I (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 145 mg/liter at 23°C (*Worthing 1979).

Appearance and Odor: Amber-colored liquid with mild chemical odor (*Worthing 1979; *Spencer 1973).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) (DOT 1984, Guide 55)
Skin: Yes (Hayes 1982, p. 396)
Ingestion: Yes (Hayes 1982, pp. 396-97)

Health Hazards (Acute, Delayed, and Chronic): Acute: cholinesterase inhibitor which affects central nervous system. Severe illness or death possible (Hayes 1982, pp. 396-397). Convulsions or coma and death (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

CHLORFENVINFOS

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes, when stored in glass or polyethylene lined containers (*Worthing 1979)

Conditions to Avoid: Alkaline aqueous solutions (*Merck 1976)

Incompatibility (Materials to Avoid): Iron, steel, and brass (*Worthing 1979).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used for control of ticks, flies, lice, and mites on cattle and for blowfly, lice, ked, and itchmite on sheep (*Farm Chemicals Handbook 1980). Controls fleas and mites on dog; do not use on cats. Used on organic wastes and breeding places of fly larvae, including diary barns (*Rossoff 1974; Hayes 1982, p. 396). Also used as a foliage insecticide for potatoes, rice, maize, and sugar cane. Used to control soil insects, i.e., rootflies, rootworms, and cutworms (*Spencer 1973).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) In case of spill or leak, do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal. Keep unnecesary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

CHLORFENVINFOS

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms typical of cholinesterase poisoning. Nausea is often first symptom, with vomiting, abdominal cramps, diarrhea, and excessive salivation. Headache, giddiness, weakness, tightness in chest, blurring of vision, pinpoint pupils, loss of muscle coordination, and difficulty breathing. Convulsions and coma precede death (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYLMERCURIC DICYANAMIDE

CAS Registry Number: 502-39-6

Synonyms: (Cyanoguanidino)Methylmercury; Agrosol; Cyano(Methylmercuri) Guanidine; Guanidine, Cyano(Methylmercurio)-; Guanidine, Cyano-, Methylmercury Deriv; Mercury, (3-Cyanoguanidino)Methyl-; Mercury, (Cyanoguanidinato)Methyl-; Mercury, (Cyanoguanidinato-N')Methyl-; Methyl Mercuric Dicyandiamide; Methylmercuric Cyanoguanidine; MMD; Morsodren; Morton EP-227; Morton Soil Drench; Morton Soil-Drench-C; N-Cyano-N'-(Methyl-mercury)Guanidine; Pano-Drench; Pano-Drench 4; Panodrin A-13; Panogen; Panogen 15; Panogen 43; Panogen 8; Panogen PX; Panogen Turf Spray; Panogen (Old); Panospray 30; R 8; R 8 (Fungicide); MEMA; Methylmercuric Dicyandiamide; Methylmercury dicyandiamide; Panogen Turf Fungicide

Chemical Formula: $C_3H_6HgN_4$

Molecular Weight: 298.72

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Mercury Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.000065 at 35°C (*Martin and Worthing 1974)

Melting Point: 313°F, 156°C (*Hawley 1981)

Vapor Density (AIR=1): Not Found

METHYLMERCURIC DICYANAMIDE

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 2.17 g/100 ml at room temperature (*Martin and Worthing 1974); soluble (Hawley 1981, p. 295)

Appearance and Odor: Crystals (*Hawley 1981)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.01 mg/m^3; ceiling concentration 0.04 mg/m^3 (NIOSH/RTECS 1983, Volume 2, p. 662)

ACGIH TLV: TWA 0.01 mg (Hg)/m^3; STEL (ceiling) 0.03 mg (Hg)/m^3 (skin) (NIOSH/RTECS 1983, Volume 2, p. 662)

IDLH: Not Found

Other Limits Recommended: IDLH for organo (alkyl) mercury compounds is 10 mg/m^3 (NIOSH/OSHA 1978, p. 144).

Routes of Entry: **Inhalation:** Yes (Gosselin 1984, p. II-137)
Skin: Yes (Gosselin 1984, p. II-137)
Ingestion: Yes (Sax 1984, p. 1868)

Health Hazards (Acute, Delayed, and Chronic): Methylmercuric dicyanamide is extremely toxic to humans. The probable lethal dose for humans is 5-50 mg/kg of body weight (between 7 drops and one teaspoon for a 150 lb. person) (*Gosselin 1984). Humans may be poisoned by feeding on the flesh of animals which have ingested this fungicide (*Clark 1981). Eating treated seeds may also cause poisoning. The poisoning may show delayed manifestations on the nervous system. Patients frequently become gradually worse after their illness is recognized and exposure is stopped (Hayes, 1982, p. 21). This compound is a strong skin irritant and produces blisters and other dermatitis (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Mercury-Based Pesticide, n.o.s.) This material may burn but will not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

METHYLMERCURIC DICYANAMIDE

SECTION IV (continued)

Special Fire Fighting Procedures: (Non-Specific -- Mercury-Based Pesticide, n.o.s.) Fight fire from maximum distance. Dike fire control water for later disposal. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Mercury-Based Pesticide, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Martin and Worthing 1974)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of mercury and nitrogen oxides (Sax 1984, p. 1868).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Fungicide; a seed, soil, and turf treatment (Buchel 1983, p. 249) especially for cereals, sorghum, sugar beets, cotton, and flax (Hayes 1982, p. 20). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Mercury-Based Pesticide n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering. Remove and isolate contaminated clothing at the site. Do not touch spilled material. Use water to reduce vapors. In event of spill or leak: take up with absorbent material and place in containers with covers. Small dry spill: with clean shovel place material into clean, dry container and cover; move containers from spill area. Dike far ahead of spill if large (DOT 1984, Guide 55).

METHYLMERCURIC DICYANAMIDE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Prolonged exposure to skin may produce blisters (*Gosselin 1984). In the case of ingestion there is nausea and abdominal pain. Vomiting and diarrhea may occur. Burning or prickling of the lips, tongue, and extremities. The patient may be confused, hallucinate, be irritable, have disturbed sleep, lose muscular coordination and lose memory. Visual fields may narrow concentrically; emotional instability may occur as well as inability to concentrate, with stupor and coma (*Rumack 1975 to Present).

Emergency and First Aid Procedures: (Non-Specific -- Mercury-Based Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PYRIDINE, 4-AMINO-

CAS Registry Number: 504-24-5

Synonyms: 4-Aminopyridine; 4-AP; 4-Pyridinamine; 4-Pyridylamine; Amino-4 Pyridine; Avitrol; gamma-Aminopyridine; MI-W-3; p-Aminopyridine; Phillips 1861; VMI 10-3

Chemical Formula: $C_5H_6N_2$

Molecular Weight: 94.13

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 524.3°F, 273.5°C (*Hawley 1977)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 318.0°F, 158.9°C (*Hawley 1977)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Moderately soluble (*Farm Chemicals Handbook 1981)

Appearance and Odor: White crystalline material with no odor (*Farm Chemicals Handbook 1981).

PYRIDINE, 4-AMINO-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Material may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes (*DOT 1984). Material affects neural transmission. In sufficient concentrations, material may cause metabolic acidosis, respiratory arrest, and cardiac arrhythmias (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: The material may burn but will not ignite easily. To extinguish use dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Wear positive pressure self-contained breathing apparatus and special protective clothing. Move container from fire area if you can do so without risk. Fight fire from maximum distance possible. Control runoff water with dikes and prevent material from scattering (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Material may produce irritating or poisonous gases in fire. Runoff from fire control water may give off poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Farm Chemicals Handbook 1981)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

PYRIDINE, 4-AMINO-

SECTION V (continued)

Hazardous Decomposition or Byproducts: It may emit irritating or poisonous gases in fire conditions (DOT 1984, Guide 55).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

SECTION VI -- USE INFORMATION

Material is used as an avicide (bird repellant), an intermediate and as a fixer in some textile dyes (*Rumack 1975 to Present, *Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate the hazardous area and deny entry. Stay upwind. Do not touch spilled material; stop leak if possible without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Nitrile	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Rapid onset of disagreeable taste, immediate burning of throat, and abdominal discomfort; in addition, weakness, dizziness, disorientation, and seizures may occur. Delayed symptoms of oral ingestion include elevated liver enzymes, and respiratory arrest (*Rumack 1975 to Present).

PYRIDINE, 4-AMINO-

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least fifteen minutes (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MUSTARD GAS

CAS Registry Number: 505-60-2

Synonyms: Sulfide, bis(2-Chloroethyl); 1,1'-Thiobis(2-Chloroethane); 1-Chloro-2-(beta-Chloroethylthio)Ethane; 2,2'-Dichlorodiethyl Sulfide; 2,2'-Dichlorodiethyl Sulphide; 2,2'-Dichloroethyl Sulfide; 2,2'-Dichloroethyl Sulphide; beta, beta'-Dichloroethyl Sulfide; beta, beta'-Dichloroethyl Sulphide; beta,beta-Dichlor-Ethyl-Sulphide; Bis(2-Chloroethyl) Sulfide; Bis(2-Chloroethyl) Sulphide; Bis(beta-Chloroethyl) Sulfide; Bis(beta-Chloroethyl) Sulphide; Di-2-Chloroethyl Sulfide; Di-2-Chloroethyl Sulphide; Distilled Mustard; Ethane, 1,1'-Thiobis(2-Chloro-; H; HD; Kampfstoff "Lost"; Mustard HD; Mustard Vapor; Mustard, Sulfur; S Mustard; S-Lost; S-Yperite; Schwefel-Lost; Sulfur Mustard; Sulfur Mustard Gas; Sulphur Mustard; Sulphur Mustard Gas; Yellow Cross Liquid; Yperite

Chemical Formula: $C_4H_8Cl_2S$

Molecular Weight: 159.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.42 mg/liter/2 minutes (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 419-423°F, 215-217°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.274 at 20°C/4°C (liquid) (*Merck 1976)

Vapor Pressure (mmHg): 0.090 at 30°C (*Merck 1976)

Melting Point: 55-57°F, 13-14°C (*Merck 1976)

Vapor Density (AIR=1): 5.4 (*Sax 1975)

MUSTARD GAS

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.68 g/liter at 25°C (*IARC 1972-1985); very sparingly soluble in water (Merck 1983, p. 904).

Appearance and Odor: Colorless oily liquid (*IARC 1972-1985) with a weak, sweet odor (*Merck 1976) or garlic-like odor (U.S. Army 1975, p. 3-8).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): The median lethal dosage is 1500 mg-minute/m^3 for inhalation and 10,000 mg-minute/m^3 for skin absorption (masked personnel). The median incapacitating dosage is 200 mg-minute/m^3 for eye injury and 2000 mg-minute/m^3 for skin absorption (masked personnel). Wet skin absorbs more material than dry skin (U.S. Army 1975, p. 3-8). May cause death or permanent injury after very short exposure to small quantities (*Sax 1975). It is a blistering gas and is highly irritating to eyes, skin, and lungs. Pulmonary lesions are often fatal (Sax 1984, pp. 461-462). Permanent eye damage and severe respiratory impairment. It is a carcinogen (Merck 1983, p. 904).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 221°F, 105°C (*Sax 1975)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with water, foam, dry chemical, or carbon dioxide (*Sax 1975).

Special Fire Fighting Procedures: Protective clothing and self-contained breathing apparatus required in presence of mustard gas (*Sax 1975). Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible (Student 1981, p.

MUSTARD GAS

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Can be ignited by large explosive charge. When heated to decomposition, emits highly toxic fumes of oxides of sulfur and chlorine containing compounds. Reacts with water or steam to produce toxic and corrosive fumes (*Sax 1975). Containers may rupture violently in a fire (Student 1981, p. 358).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes; hydrolyzed in aqueous solution (*IARC 1972-1985)
Stable:

Conditions to Avoid: High heat; contact with acid or acid fumes (*Sax 1984, p. 482).

Incompatibility (Materials to Avoid): Incompatible with bleaching powder (Sax 1984, p. 482). Reacts violently with oxidizing materials. Reacts with water or steam to produce toxic and corrosive fumes (*Sax 1975).

Hazardous Decomposition or Byproducts: Emits highly toxic fumes of oxides of sulfur and chlorine containing compounds when heated to decomposition or on contact with acid or acid fumes (*Sax 1974)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It has been used as a chemical warfare agent (*IARC 1972-1985) and as a chemical intermediate. It is not produced commercially in the U.S. (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

To clean up a spill, cover with up to 15 percent calcium hypochloride. Place in container; neutralize after 12 hours if necessary (*Rumack 1975 to Present). Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Attempt to stop leak if without hazard. Use water spray to knock down vapors. Avoid breathing vapors and bodily contact with the material. Keep upwind. Wash away any material which may have contacted the body with copious amounts of soap and water. Downwind evacuation must be considered (Student 1981, p. 358).

MUSTARD GAS

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: May cause conjunctivitis and blindness. In 1-12 hours there may be coughing, swollen eyelids, reddened skin, and severe itching. There may be swelling and destruction of tissue in the respiratory tract and exposed skin. Ingestion may cause nausea and vomiting (*Merck 1976).

Emergency and First Aid Procedures: Remove patient from contaminated atmosphere as rapidly as possible. Irrigate exposed eyes with water for at least 15 minutes. Wash exposed areas of the skin twice with soap and water. Local lesions should be cleaned and treated similarly to burns with emollients (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- POTASSIUM SILVER CYANIDE

CAS Registry Number: 506-61-6

Synonyms: Argentate(1-), bis(Cyano-C)-, Potassium; Argentate(1-), Dicyano-, Potassium; Argentates(I) (Sol), Dicyano-; Potassium Argentocyanide; Potassium bis(Cyano-C)Argentate(1-); Potassium Dicyanoargentate; Potassium Dicyanoargentate (KAg(CN)2); Potassium Dicyanoargentate(1-); Potassium Dicyanoargentate(I); Potassium Silver Cyanide (KAg(CN)2); Silver Potassium Cyanide [AgK(CN)2]

Chemical Formula: C_2AgN_2K

Molecular Weight: 199.01

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 21 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): In Cyanide Compounds and Silver Compounds categories

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 2.36 at 25°C (*Hawley 1977)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Merck 1976)

POTASSIUM SILVER CYANIDE

SECTION II (continued)

Appearance and Odor: White crystals (*Merck 1976)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: (Cyanides) TWA 5 mg/m^3, as cyanide (skin) (AGCIH 1986-87, p.14)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): The primary health hazard is as a cyanide (*Gosselin 1976). (Non-specific -- Cyanide, Inorganic, n.o.s.). It is poisonous and may be fatal if inhaled, swallowed or absorbed through the skin. Fire may produce irritating or poisonous gases (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Cyanide, Inorganic, n.o.s.) Use dry chemical, carbon dioxide, water spray, or foam for small fire, and water spray, fog, or foam for large fires. Move containers of this material away from fire area if this can be done without risk (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Cyanide, Inorganic, n.o.s.) Isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Fight fire from maximum distance. Dike fire control water for later disposal. Do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, potassium silver cyanide emits very toxic fumes of cyanide and nitrogen oxides (Sax 1984, p. 2282).

NFPA Flammability Rating: Not Found

POTASSIUM SILVER CYANIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Light (*Merck 1976)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, potassium silver cyanide emits very toxic fumes of cyanide and nitrogen oxides (Sax 1984, p. 2282).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Potassium silver cyanide is used in silver plating, as a bactericide (*Merck 1976), and in the manufacture of antiseptics (*Hawley 1977). Not registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation or skin contact (see Section III above). (Non-Specific -- Cyanide, Inorganic, n.o.s.) Do not touch spilled materials; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

POTASSIUM SILVER CYANIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: As a cyanide, massive doses may produce, without warning, sudden loss of consciousness and prompt death from respiratory arrest. Smaller but still lethal doses result in illness that may be prolonged for 1 or more hours. Other symptoms may include numbness in throat, salivation, nausea, anxiety, dizziness, irregular breathing, odor of bitter almonds may be noted on breath, blood pressure may rise, slowing of the heart beat, sensation of constriction in the chest, unconsciousness followed by violent convulsions and paralysis (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Cyanide, Inorganic, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CYANOGEN BROMIDE

CAS Registry Number: 506-68-3

Synonyms: Bromine Cyanide; Bromocyan; Bromocyanide; Bromocyanogen; Campilit; Cyanobromide; Cyanogen Monobromide; TL 822

Chemical Formula: CBrN

Molecular Weight: 105.93

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (human) 0.398 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 142°F, 61.4°C (*Weast 1979)

Specific Gravity (H_2O=1): 2.015 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 92 at 20°C (*Patty 1963)

Melting Point: 126°F, 52°C (*Merck 1976)

Vapor Density (AIR=1): 3.62 (*Patty 1963)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Weast 1979)

Appearance and Odor: Colorless to white cubes or needle-like crystals with a penetrating odor (*Merck 1976; *Sax 1979; *NFPA 1978; *Patty 1963)

CYANOGEN BROMIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: (Cyanides) TWA 5mg/m^3, as cyanide (skin) (ACGIH 1986-87, p. 14)

IDLH: Not Found

Other Limits Recommended: Suggested TLV less than 0.5 ppm (*Patty 1963).

Routes of Entry: **Inhalation:** Yes (*NIOSH 1979)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Super toxic; probable oral lethal dose in humans is less than 5 mg/kg or a taste (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976). Vapors are highly irritant and very poisonous (*Merck 1976).

Medical Conditions Generally Aggravated by Exposure: Individuals with chronic diseases of the kidneys, respiratory tract, skin, or thyroid are at greater risk of developing toxic cyanide effects (*Encyc Occupat Health and Safety 1983).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Noncombustible (NFPA 1978, p. 49-34)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish fire using agent suitable for type of surrounding fire. Material itself does not burn or burns with difficulty. Use foam, carbon dioxide, or dry chemical. Cool all affected containers with flooding quantities of water. Do not use water on material itself. If large quantities of combustibles are involved, use water in flooding quantities as spray and fog. Use water spray to absorb vapors. Keep material out of water sources and sewers. Use water spray to knock down vapors (Student 1981, p. 158).

Special Fire Fighting Procedures: Wear full protective clothing. Avoid direct water contact as it will cause cyanogen bromide to decompose, releasing toxic gases (*NFPA 1978). Avoid breathing vapors or dusts; keep upwind; wear self-contained breathing apparatus (Student 1981, p. 158).

Unusual Fire and Explosion Hazards: Cyanogen bromide is not combustible itself, but impure cyanogen bromide decomposes rapidly and tends to explode (*Merck 1976). A violent reaction may take place on contact with large quantities of acid (*NFPA 1978). Vapors are highly irritating (*Merck 1976).

NFPA Flammability Rating: 0

CYANOGEN BROMIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes, impure material decomposes rapidly and tends to explode (*Merck 1976)

Stable:

Conditions to Avoid: Avoid physical damage, contact with acids or water, and store away from a location where water may be needed for fire control (*NFPA 1978).

Incompatibility (Materials to Avoid): Water, acids (*NFPA 1978)

Hazardous Decomposition or Byproducts: When material is heated to decomposition, it emits very toxic fumes of cyanide and bromide (Sax 1984, p. 825).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Cyanogen bromide is used in organic synthesis, as a fumigant, a pesticide, in cellulose technology, and in gold-extraction (*Patty 1963). Not registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

CYANOGEN BROMIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CYANOGEN BROMIDE

(506-68-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Cyanogen bromide toxicity can occur via ingestion, dermal/eye contact, or inhalation; death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility!*

Substance Characteristics:

Pure Forms - White cubes or needlelike crystals.

Odor - Penetrating.

Commercial Form - 97% pure solid.

Uses - Fumigant, chemical intermediate.

Materials to Avoid - Acids, water (except for use in emergency life support).

Other Names - Bromine cyanide, Bromocyan, Cyanobromide, TL-822.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), sodium bicarbonate, diazepam, phenytoin.

Signs and Symptoms of Acute Cyanogen Bromide Exposure:

Warning: *Cyanogen bromide may be fatal if inhaled, swallowed, or absorbed through skin or mucous membranes. Caution is advised.*

Signs and symptoms of acute exposure to cyanogen bromide may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cherry-red or bloody mucous membranes may be noted. Cardiac arrhythmias and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous membranes) may be observed.

CYANOGEN BROMIDE

Headache, vertigo (dizziness), agitation, and giddiness may be followed by combative behavior, convulsions, paralysis, protruding eyeballs, dilated and unreactive pupils, and coma. Tachypnea (rapid, shallow respirations) or hyperpnea (rapid, deep respirations) may be followed by respiratory depression. Lung hemorrhage and pulmonary edema may also occur.

Cyanogen bromide is irritating to the skin, eyes, and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common. Salivation, nausea, and vomiting may also occur.

Emergency Life-Support Procedures:

Acute exposure to cyanogen bromide may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to cyanogen bromide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with cyanogen bromide-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to cyanogen bromide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory d.

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Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with cyanogen bromide-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with cyanogen bromide-contaminated persons or their gastric contents can result in self-poisoning.*

2. RUSH to a health care facility!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. DO NOT induce vomiting or attempt to neutralize!

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CYANOGEN IODIDE

CAS Registry Number: 506-78-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 545): Iodine Cyanide; Jodcyan

Chemical Formula: CIN

Molecular Weight: 152.92

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (cat) 18 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 2.84 (Hawley 1981, p. 295)

Vapor Pressure (mmHg): 1 at 25.2°C (Sax 1984, p. 826)

Melting Point: 295.7°F, 146.5°C (Hawley 1981, p. 295)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly (Weast 1980, p. C-259)

Appearance and Odor: White needles with a very pungent odor (Merck 1983, p. 385).

CYANOGEN IODIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: (Cyanides) TWA 5.0 mg/m^3, as cyanide (skin) (ACGIH 1986-87, p. 14)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** No (Merck 1983, p. 385)
Skin: Yes (Sax 1984, p. 826, p. 822)
Ingestion: Yes (Sax 1984, p. 826, p. 822)

Health Hazards (Acute, Delayed, and Chronic): Causes convulsions, paralysis and death from respiratory failure (Merck 1983, p. 385). Highly toxic; strong irritant to eyes and skin (Hawley 1981, p. 295).
(Non-Specific -- Cyanide or Cyanide Mixture, Dry): Poisonous, may be fatal if swallowed or absorbed through skin. Contact may cause burns to the skin and eyes. Fire may produce irritating or poisonous gases (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Cyanide or Cyanide Mixture, Dry) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Cyanide or Cyanide Mixture, Dry) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides, cyanide, and iodide (Sax 1984, p. 826).

NFPA Flammability Rating: Not Found

CYANOGEN IODIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Phosphorus (Sax 1984, p. 826)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides, cyanide, and iodide (Sax 1984, p. 826).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Taxidermists' preservatives (Hawley 1981, p. 295). Generally for destroying all lower forms of life (Merck 1983, p. 385).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Cyanide or Cyanide Mixture, Dry) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Can cause death due to respiratory failure (Merck 1983, p. 385). Health effects are similar to cyanides and iodides (Sax 1984, p. 826). Upon ingestion, a bitter, acrid, burning taste is sometimes noted. Other symptoms are anxiety, confusion, dizziness, giddiness, rapid and difficult breathing, palpitations, tightness in chest, unconsciousness, violent convulsions and death (Gosselin 1984, p. III-127).

CYANOGEN IODIDE

SECTION IX (continued)

Emergency and First Aid Procedures: (Non-Specific -- Cyanide or Cyanide Mixture, Dry) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

NIOSH/OSHA 1978
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TETRANITROMETHANE

CAS Registry Number: 509-14-8

Synonyms: Methane, Tetranitro; NCI-C55947; Tetan; TNM

Chemical Formula: CN_4O_8

Molecular Weight: 196.04

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.144 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 259°F, 126°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.6380 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): 13 at 25°C (*Patty 1963)

Melting Point: 57.6°F, 14.2°C (*Weast 1979)

Vapor Density (AIR=1): 6.8 (*Patty 1963)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Weast 1979)

Appearance and Odor: Pale yellow liquid (*Merck 1976) or colorless oily fluid with acrid biting odor (*Patty 1963), causes tears (NIOSH/OSHA 1978, p. 178).

TETRANITROMETHANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 ppm (8 mg/m^3) (NIOSH 1987, p. 222)

ACGIH TLV: TWA 1 ppm (8 mg/m^3) (*ACGIH 1980)

IDLH: 5 ppm (NIOSH/OSHA 1978, p. 178)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Patty 1963)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Patty 1963)

Health Hazards (Acute, Delayed, and Chronic): Acute effects include irritation of the eyes and respiratory passages and mild burns to the skin (*Sax 1975). After more prolonged inhalation, headache and respiratory distress may occur (*Patty 1963). After prolonged exposure, central nervous system, heart, liver, and kidney damage can occur as well as pulmonary edema (*ACGIH 1980; *Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Non-combustible (NIOSH/OSHA 1978, p. 178)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish small fires with water only, no dry chemicals or carbon dioxide. For large fires, flood the fire area with water (DOT 1984, Guide 47).

Special Fire Fighting Procedures: Do not move cargo or vehicle if cargo has been exposed to heat. Cool containers that are exposed to flames with water from the side until well after fire is out. For massive fire, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn (DOT 1984, Guide 47).

Unusual Fire and Explosion Hazards: Spontaneous chemical reaction may produce fire. Material is a strong oxidizer. The potential for explosion is severe, especially when exposed to heat or to powerful oxidizing or reducing agents; or when shocked or heated (*Sax 1975). It is more easily detonated than TNT (*Patty 1963). Impurities can also cause explosion (*Merck 1976). The material is highly sensitive; hydrocarbons exposed to it form exceedingly sensitive explosives (*NFPA 1978).

NFPA Flammability Rating: Not Found

TETRANITROMETHANE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Sax 1975)
Stable:

Conditions to Avoid: Impurities, shock, heat, and reducing agents (*Sax 1975)

Incompatibility (Materials to Avoid): Hydrocarbons, aluminum, toluene, cotton, aromatic nitro compounds (Sax 1984, p. 2550); alkalis, metals (NIOSH/OSHA 1978, p. 178); and rubber (Merck 1983, p. 1321).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of oxides of nitrogen. Shock will explode it (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is proposed as an irritant war gas (*Merck 1976). It is used as an oxidizing agent in rocket propellants; explosives; diesel fuel additives; and a reagent for detecting double bonds (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Remove all ignition sources. Ventilate area of spill or leak. Collect for reclamation or absorb in vermiculite, dry sand, earth or a similar material. Avoid shock and friction if liquid spills on combustible material such as wood, or paper (*NIOSH/OSHA 1981). Use water spray to reduce vapors. Flush area with flooding amounts of water and dike spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 47).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

TETRANITROMETHANE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include burning eyes, skin, and mucous membranes (*Sax 1975); headache, difficulty in breathing, and dizziness. Skin contact results in bluish discoloration of skin and mucous membranes (cyanosis), and skin burns (NIOSH/OSHA 1978, p. 179). Chronic signs and symptoms included weariness, and pneumonia (*ACGIH 1980).

Emergency and First Aid Procedures: Exposed skin should be washed twice with soap and water. Flush eyes with water at least 15 minutes (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DITHIAZANINE IODIDE

CAS Registry Number: 514-73-8

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 664): Benzothiazolium, 3-Ethyl-2-(5-(3-Ethyl-2-Benzothiazolinylidene)-1,3-Pentadienyl)-, Iodide; Abminthic; Anelmid; Delvex; 3,3'-Diethylpentamethinethiacyanine Iodide; Dilombrin; 3,3'-Diethylthiadicarbocyanine Iodide; L-01748; Omni-Passin; Partel; Telmid; Vercidon; 3-Ethyl-2-(5-(3-Ethyl-2-Benzothiazolylidene)-1,3-Pentadienyl)benzothiazolium Iodide; Anguifugan; Dejo; Deselmine; Dizan; Nectocyd; Telmicid (Merck 1983, p. 492)

Chemical Formula: $C_{23}H_{24}N_2S_2I$

Molecular Weight: 519.51

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Decomposes at 248°C (Merck 1983, p. 492)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Merck 1983, p. 492)

DITHIAZANINE IODIDE

SECTION II (continued)

Appearance and Odor: Green, needle-like crystals (Merck 1983, p. 492).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1024)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic by mouth (Sax 1984, p. 1024). (Non-Specific -- Pesticide, Solid, n.o.s.) Poisonous if swallowed, or if dust is inhaled (DOT 1984, Guide 53).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) This material may burn but does not ignite readily. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained, postive pressure if available, breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of iodine, sulfur oxides, and nitrogen oxides (Sax 1984, p. 1024).

NFPA Flammability Rating: Not Found

DITHIAZANINE IODIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of iodine, sulfur oxides, and nitrogen oxides (Sax 1984, p. 1024).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Veterinary anthelmintic, sensitizer for photographic emulsions (Merck 1983, p. 492) and for insecticides (Farm Chemicals Handbook 1984, p. C-85). Not registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb with sand or other non-combustible 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

DITHIAZANINE IODIDE

COMMENTS

- **Sources searched but no information found:**

  Weast 1979
  Hawley 1981
  ACGIH 1984
  NIOSH/OSHA 1978
  Weiss 1980
  Gosselin 1984
  Hayes 1982
  Buchel 1983
  Encyc Occupat Health and Safety 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BIS(CHLOROMETHYL) KETONE

CAS Registry Number: 534-07-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 325) 2-Propanone, 1,3-Dichloro-; sym-Dichloroacetone; alpha,alpha'-Dichloroacetone; alpha,gamma-Dichloroacetone; 1,3-Dichloroacetone; 1,3-Dichloro-2-Propanone

Chemical Formula: $C_3H_4Cl_2O$

Molecular Weight: 126.97

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.027 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 343°F, 173°C (Merck 1983, p. 443)

Specific Gravity (H_2O=1): 1.3826 at 46°C/4°C (Merck 1983, p. 443)

Vapor Pressure (mmHg): Not Found

Melting Point: 113°F, 45°C (Merck 1983, p. 443)

Vapor Density (AIR=1): 4.38 (Sax 1984, p. 464)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Merck 1983, p. 443)

Appearance and Odor: Crystalline solid (Merck 1983, p. 443)

BIS(CHLOROMETHYL) KETONE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 464)
Skin: Yes (DOT 1984, Guide 55)
Ingestion: Yes (Sax 1984, p. 464)

Health Hazards (Acute, Delayed, and Chronic): It may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes. Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorities (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits highly toxic fumes of chlorides (Sax 1984, p. 464). This material may burn but does not ignite readily. Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

BIS(CHLOROMETHYL) KETONE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of chlorides (Sax 1984, p. 464).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Formerly extensively used in textiles (especially polyester fabrics) and still employed in polyurethane foams, textile backcoating and adhesives (Gosselin 1984, p. II-303).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation. In case of contact, immediately flush skin or eyes with water (see Section III above). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. For small spills, absorb 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. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: It causes tearing and blistering (Merck 1983, p. 443).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material,

BIS(CHLOROMETHYL) KETONE

SECTION IX (continued)

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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DINITROCRESOL

CAS Registry Number: 534-52-1

Synonyms: 4,6-Dinitro-o-Cresol; 2,4-Dinitro-6-Methylphenol; 2-Methyl-4,6-Dinitrophenol; 3,5-Dinitro-2-Hydroxytoluene; 6-Methyl-2,4-Dinitrocresol; Antinonin; Antinonnin; Arborol; Capsine; Chemsect DNOC; Degrassan; Dekrysil; Detal; Dillex; Dinitro; Dinitro-o-Cresol; Dinitrodendtroxal; Dinitrol; Dinitromethyl Cyclohexyltrienol; Dinitrosol; Dinoc; Dinurania; Ditrosol; DN; DN-Dry Mix No. 2; DNC; DNOC; Effusan 3436; Elgetol; Elgetol 30; Elipol; ENT 154; Extrar; Hedolit; K III; K IV; Krenite; Kreozan; Kresamone; Krezotol 50; Sandolin A; Selinon; Toluene, 3,5-Dinitro-2-Hydroxy-; Phenol, 2-methyl-4,6-dinitro

Chemical Formula: $C_7H_6N_2O_5$

Molecular Weight: 198.13

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 594°F, 312°C (ACGIH 1980, p. 152)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.00005 (NIOSH/OSHA 1978, p. 90)

Melting Point: 190°F, 87.5°C (*Merck 1976)

Vapor Density (AIR=1): 6.82 (Sax 1984, p. 1212)

Evaporation Rate (Butyl acetate=1): Not Found

DINITROCRESOL

SECTION II (continued)

Solubility in Water: 0.01 g in 100 ml (NIOSH/OSHA 1978, p. 90)

Appearance and Odor: Yellow odorless solid (NIOSH/OSHA 1978, p. 90; *Spencer 1982)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 200 mg/m^3 (NIOSH 1987, p. 110)

ACGIH TLV: TWA 0.2 mg/m^3 (skin) (ACGIH 1986-87, p. 17)

IDLH: 5 mg/m^3 (NIOSH/OSHA 1980, p. 90)

Other Limits Recommended: NIOSH: 0.2 mg/m^3 10-hour TWA (NIOSH 1987, p.110)

Routes of Entry: **Inhalation:** Yes (ACGIH 1980, p. 152)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic material; probable oral lethal dose is 5-50 mg/kg in humans or between 7 drops and 1 teaspoonful for a 70 kg (150 lb.) person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): None (NIOSH/OSHA 1978, p. 90)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Water, foam, dry chemical, carbon dioxide (*CHRIS 1980)

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area. Stay upwind and keep out of low areas. Wear self-contained breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: It is explosive and is usually moistened with up to 10 percent water to reduce the hazard (*Spencer 1982).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

DINITROCRESOL

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

4,6-Dinitro-o-cresol is used as a spray to kill insect eggs on fruit trees, as an herbicide, and as an insecticide (Hawley 1981, p. 374).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if it can be done without risk. Take up small spills with sand or other noncombustible absorbent material; place into containers for later disposal. Small dry spills may be shoveled into clean, dry containers and covered. Larger spills should be diked for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DINITROCRESOL

(534-52-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Yellow prisms or needles.

Odor - None.

Commercial Forms - 95 to 98% pure solid usually mixed with 10% water, paste (with ammonium sulfate), or solution in petroleum oil.

Uses - Herbicide, insecticide, dyestuff industry.

Materials to Avoid - Metals.

Other Names - Antinonin, Arborol, Capsine, Degrassan, Detal, Dillex, Dinitro, 4,6-dinitro-o-cresol, Dinoc, Elgetol, Krenite, Kreozan, 2-methyl-4,6-dinitrophenol, Selinon.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Dinitrocresol Exposure:

Warning: *Effects may be delayed for several hours. Toxicity of dinitrocresol is enhanced by high ambient temperature and physical activity. Caution is advised.*

Early manifestations of acute dinitrocresol exposure include fever, sweating, headache, and confusion. Blood pressure, pulse, and respiratory rate are often elevated. Severe exposure may result in restlessness, seizures, and coma. Other signs and symptoms include dyspnea (shortness of breath), cyanosis (blue tint to skin and mucous membranes), pulmonary edema, nausea, vomiting, and abdominal pain. Liver injury with associated jaundice, kidney failure, and

DINITROCRESOL

cardiac arrhythmias are commonly noted. Dermal exposure results in yellow staining of the skin and may produce burns. Dinitrocresol may irritate and burn the eyes and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to dinitrocresol may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to dinitrocresol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to dinitrocresol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

DINITROCRESOL

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. DO NOT induce vomiting.

4. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CRIMIDINE

CAS Registry Number: 535-89-7

Synonyms: Pyrimidine, 2-Chloro-4-(Dimethylamino)-6-Methyl-; 2-Chloro-4-Dimethylamino-6-Methyl-Pyrimidine; 2-Chloro-4-Methyl-6-Dimethylaminopyrimidine; 2-Chloro-N,N-6-Trimethyl-4-Pyrimidinamine; 4-Pyrimidinamine, 2-Chloro-N,N,6-trimethyl-; Castrix; W 491

Chemical Formula: $C_7H_{10}N_3Cl$

Molecular Weight: 171.65

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 1.2 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 284-297°F, 140-147°C at 4 mmHg (*Weast 1974)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Less than 10-5 at 20°C (*Hartley 1983)

Melting Point: 189°F, 87°C (*Weast 1974)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.936 g/100 mL at 20°C (*Hartley 1983)

Appearance and Odor: Brown waxy solid (*Weast 1974); colorless crystals (*Hartley 1983)

CRIMIDINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (*Gosselin 1984)

Health Hazards (Acute, Delayed, and Chronic): Super toxic; probable oral lethal dose in humans is less than 5 mg/kg or less than 7 drops for a 70 kg (150 lb.) person (*Gosselin 1984). May cause serious central nervous system damage leading to convulsions (*Merck 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus for fumes (*Hartley 1983).

Unusual Fire and Explosion Hazards: It emits highly toxic fumes when heated to decomposition (*Sax 1975).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes, very stable in neutral medium (*Hartley 1983)

Conditions to Avoid: Decomposing heat (*Sax 1975)

Incompatibility (Materials to Avoid): Acids and acid fumes (*Sax 1975)

Hazardous Decomposition or Byproducts: It emits highly toxic chloride fumes when heated to decomposition (*Sax 1975)

CRIMIDINE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a rodenticide (*Merck 1983). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal. If water pollution occurs, notify appropriate authorities (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Exposure may result in serious central nervous system damage leading to convulsions that may be fatal (*Merck 1976). Symptoms include restlessness; apprehension; muscular stiffness; sensitivity to light, noises, and contact; and cold sweat. If patient survives 5 to 6 hours there may not be serious problems (*Gosselin 1984).

CRIMIDINE

SECTION IX (continued)

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHYLBIS(2-CHLOROETHYL)AMINE

CAS Registry Number: 538-07-8

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 818): Triethylamine, 2,2'-Dichloro-; bis(2-Chloroethyl)Ethylamine; Ethylbis(beta-Chloroethyl)Amine; Ethyl-S; HN1; TL 329
(U.S. Army 1975 Synonyms, p. 3-9): Nitrogen Mustard; HN-1

Chemical Formula: $C_6H_{13}Cl_2N$

Molecular Weight: 170.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} dermal (mouse) 13 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 185°F, 85°C at 12 mmHg (Merck 1983, p. 683)

Specific Gravity (H_2O=1): 1.0861 at 23°C/4°C (Merck 1983, p. 683)

Vapor Pressure (mmHg): 0.24 at 25°C (U.S. Army 1975, p. 3-9)

Melting Point: -29°F, -34°C (Merck 1983, p. 683)

Vapor Density (AIR=1): 5.9 (U.S. Army 1975, p. 3-9)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (Merck 1983, p. 683)

Appearance and Odor: Liquid with a faint, fishy amine odor (Merck 1983, p. 683).

ETHYLBIS(2-CHLOROETHYL)AMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 458)
Skin: Yes (Sax 1984, p. 458)
Ingestion: Yes (Sax 1984, p. 458)

Health Hazards (Acute, Delayed, and Chronic): This compound is a nitrogen mustard. It is highly irritating to skin, eyes, and mucous membranes (Merck 1983, p. 683). Nitrogen mustards have preferential toxicity for rapidly dividing cells. Workers exposed briefly to estimated concentrations of 10-100 ppm by inhalation became severely ill (Encyc Occupat Health and Safety 1983, p. 462). The median lethal dosage is 1,500 mg-minute/m^3 (U.S. Army 1975, p. 3-9).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): High enough not to interfere with military use of the agent (U.S. Army 1975, p. 3-9).
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and chlorides (Sax 1984, p. 458).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (U.S. Army 1975, p. 3-9)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and chlorine (Sax 1984, p. 458).

ETHYLBIS(2-CHLOROETHYL)AMINE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Polymerizes slowly (U.S. Army 1975, p. 3-10). (Hazard not specified.)

SECTION VI -- USE INFORMATION

Delayed-action, military casualty agent (U.S. Army 1975, p. 3-10)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). (Non-Specific -- Poisonous Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Irritates the eyes in quantities which do not significantly damage the skin or respiratory tract, insofar as single exposures are concerned. After mild vapor exposure, there may be no skin lesions. After severe vapor exposures, or after exposure to the liquid, erythema may appear. Irritation and itching may occur. Later, blisters may appear in the erythematous areas. Effects on the respiratory tract include irritation of the nose and throat, hoarseness progressing to loss of voice, and a persistent cough. Fever, labored respiration, and moist rales develop. Bronchial pneumonia may appear after the first 24 hours. Following ingestion or systemic absorption, material causes inhibition of cell mitosis, resulting in depression of the blood-forming mechanism and

ETHYLBIS(2-CHLOROETHYL)AMINE

SECTION IX (continued)

injury to other tissues. Severe diarrhea, which may be hemorrhagic, occurs. Lesions are most marked in the small intestine and consist of degenerative changes and necrosis in the mucous membranes. Ingestion of 2 to 6 milligrams causes nausea and vomiting (U.S. Army 1975, p. 3-9).

Emergency and First Aid Procedures: (Non-Specific -- Nitrogen Mustards) Stop exposure and treat symptomatically (Gilman 1985, p. 1257). (Non-Specific -- Poisonous Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Weast 1979
Hawley 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- LEWISITE

CAS Registry Number: 541-25-3

Synonyms: Arsine, Dichloro(2-Chlorovinyl)-; Arsine, (2-Chlorovinyl) Dichloro-; Arsonous Dichloride, (2-Chloroethenyl)- (90); Chlorovinylarsine Dichloride; beta-Chlorovinylbichloroarsine; 2-Chlorovinyldichloroarsine; Dichloro(2-Chlorovinyl)Arsine

Chemical Formula: $C_2H_2AsCl_3$

Molecular Weight: 207.31

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} dermal (rabbit) 6 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 374°F, 190°C (decomposes) (Merck 1983, p. 445)

Specific Gravity (H_2O=1): 1.888 at 20°C/4°C (Merck 1983, p. 445)

Vapor Pressure (mmHg): 0.395 at 20°C (Merck 1983, p. 445)

Melting Point: 32°F, 0.1°C (Merck 1983, p. 445)

Vapor Density (AIR=1): 7.1 (U.S. Army 1975, pp. 3-11, 3-12)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Merck 1983, p. 445)

Appearance and Odor: Liquid with odor of geraniums (Merck 1983, p. 445).

LEWISITE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 500 mg/m^3 as arsenic (NIOSH/RTECS 1982, p. 442)

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 783)
Skin: Yes (Sax 1984, p. 783)
Ingestion: Yes (Sax 1984, p. 783)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic by all routes of exposure. Lethal dose in humans is 6 ppm (inhalation), 20 mg/kg (skin) (Sax 1984, p. 783). Eye injury below 300 mg-min./m^3. It is a blister agent, cell irritant, and systemic poison (U.S. Army 1975, pp. 3-11, 3-12).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): None (U.S. Army 1975, pp. 3-11, 3-12)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Arsenic Compound, Liquid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, or foam. Use water spray, fog, or foam for large fires (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Arsenic Compound, Liquid, n.o.s.) Wear special protective clothing and positive pressure breathing apparatus (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Arsenic Compound, Liquid, n.o.s.) Container may explode in heat of fire. Fire may produce irritating and poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Hydrolyzed by alkalies; neutralized by sodium hypochlorite (Merck 1983, p. 445).

Hazardous Decomposition or Byproducts: Not Found

LEWISITE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Vesicant war gas; chemical warfare agent (Doull 1980, p. 279).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid contact with eyes and skin; avoid breathing vapors (see Section III above). (Non-Specific -- Arsenic Compound, Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55). Can be decontaminated by supertropical bleach, DS2, or caustic soda (U.S. Army 1975, pp. 3-11, 3-12).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This material causes pulmonary edema, diarrhea, restlessness, weakness, subnormal temperature and low blood pressure. It produces an immediate searing sensation in the eye, and permanent loss of sight if not decontaminated within 1 minute. It produces an immediate and strong stinging sensation to the skin, followed by reddening within 30 minutes and blistering after about 13 hours. Inhalation of high concentrations may be fatal in as short a time as 10 minutes (U.S. Army 1975, pp. 3-11, 3-12).

Emergency and First Aid Procedures: (Non-Specific -- Arsenic Compound, Liquid, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain

LEWISITE

SECTION IX (continued)

normal body temperature. Effects may be delayed; keep victim under observation. Speed in removing material from skin is of extreme importance (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DITHIOBIURET

CAS Registry Number: 541-53-7

Synonyms: Biuret, 2,4-Dithio-; Imidodicarbonimidothioic Diamide; Imidodicarbonodithioic Diamide; Thioimidodicarbonic Diamide; DTB; Urea, 2-thio-1-(thiocarbamoyl)-

Chemical Formula: $C_2H_5N_3S_2$

Molecular Weight: 135.22

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.522 at 30°C (Merck 1983, p. 493)

Vapor Pressure (mmHg): Not Found

Melting Point: 358°F, 181°C (decomposes) (Merck 1983, p. 493)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.27 g/100 mL at 27°C (Merck 1983, p. 493)

Appearance and Odor: Crystalline solid (Merck 1983, p. 493)

DITHIOBIURET

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1257)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1257)

Health Hazards (Acute, Delayed, and Chronic): The material is highly toxic. It may cause respiratory failure (Merck 1983, p. 493).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Dithiocarbamate Pesticide, Solid, n.o.s.) Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide or dry chemical (Student 1981, p. 213).

Special Fire Fighting Procedures: (Non-Specific -- Dithiocarbamate Pesticide, Solid, n.o.s.) Wear boots, protective gloves, goggles and self-contained breathing apparatus (Student 1981, p. 213).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits highly toxic fumes of oxides of sulfur and nitrogen (Sax 1984, p. 1257).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

DITHIOBIURET

SECTION V (continued)

Hazardous Decomposition or Byproducts: Sulfur oxides and nitrogen oxides are formed when the material is heated to decomposition (Sax 1984, p. 1257).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a plasticizer, as a rubber accelerator, and as an intermediate in manufacturing of pesticides (Merck 1983, p. 493).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Dithiocarbamate Pesticide, Solid, n.o.s.) Keep sparks, flames and other sources of ignition away. Keep material out of water sources and sewers. Avoid breathing dusts and fumes from burning material. Keep upwind; avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 213).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include respiratory paralysis (Merck 1983, p. 493).

Emergency and First Aid Procedures: (Non-Specific -- Dithiocarbamate Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPIONITRILE, 3-CHLORO-

CAS Registry Number: 542-76-7

Synonyms: 3-Chloropropanonitrile; 1-Chloro-2-Cyanoethane; 3-Chloropropanenitrile; 3-Chloropropionitrile; beta-Chloropropionitrile; Propanenitrile, 3-Chloro-; USAF A-8798

Chemical Formula: C_3H_4ClN

Molecular Weight: 89.53

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 347-349°F, 175-176°C (Weast 1983, p. C-477)

Specific Gravity (H_2O=1): 1.1573 at 20°C (Weast 1983, p. C-477)

Vapor Pressure (mmHg): 5 at 46°C (*Patty 1963)

Melting Point: -60°F, -51°C (*Merck 1976)

Vapor Density (AIR=1): 3.0 (NFPA 1984, p. 325M-26)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 4.5 g/100 mL at 25°C (Merck 1983, p. 304)

Appearance and Odor: Colorless liquid with a characteristic acrid odor (*Hawley 1977)

PROPIONITRILE, 3-CHLORO-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Hawley 1977)
Skin: Yes (*Hawley 1977)
Ingestion: Yes (*Hawley 1977)

Health Hazards (Acute, Delayed, and Chronic): Toxic effects are a result of systemic cyanide poisoning (*Merck 1976). (Non-Specific -- Cyanide) Few poisons are more rapidly lethal. Average oral lethal dose for hydrogen cyanide is approximately 60-90 mg (corresponds to 200 mg of potassium cyanide). Cause of death is lack of oxygen to the body's cells (especially the brain and heart) as a result of the chemical inhibiting cell enzymes (Gosselin 1984, pp. III-124-125).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 168°F (CC) (*Hawley 1977; Sax 1984, p. 769)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Alcohol foam is recommended, but water spray can be used because the material can be cooled below its flash point (NFPA 1984, p. 325M-26).

Special Fire Fighting Procedures: (Non-Specific -- Propionitrile) Wear positive pressure breathing apparatus and special protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Toxic gas (hydrogen chloride) is released when the compound is heated above 130°C (266°F) (*Merck 1976). When heated to decomposition, it emits very toxic fumes of chlorine-containing compounds and nitrogen oxides (Sax 1984, p. 769).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

PROPIONITRILE, 3-CHLORO-

SECTION V (continued)

Incompatibility (Materials to Avoid): Heat (*Merck 1976).

Hazardous Decomposition or Byproducts: Hydrogen chloride is a by-product (*Merck 1976). Also, when heated to decomposition, it emits very toxic fumes of chlorine-containing compounds and nitrogen oxides (Sax 1984, p. 769).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in pharmaceutical and polymer synthesis (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Propionitrile) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Absorb small spills with sand or other noncombustible absorbent material. Dike far ahead of spill for later disposal. Isolate hazard area and deny entry. Stay upwind (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

PROPIONITRILE, 3-CHLORO-

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Cyanide) Symptoms include rapid and irregular breathing, anxiety, confusion, odor of bitter almonds (on breath or vomitus), nausea, vomiting (if oral exposure), irregular heart beat, a feeling of tightness in the chest, bright pink coloration of the skin, sweating, protruding eyeballs, dilated pupils, unconsciousness followed by convulsions, involuntary urination and defecation, paralysis and respiratory arrest (heart will beat after breathing stops) (Gosselin 1984, p. III-126-127).

Emergency and First Aid Procedures: (Non-Specific -- Cyanide) Get emergency medical treatment immediately. If victim has taken the substance by ingestion (orally) and is not showing symptoms, give syrup of ipecac. If there is exposure through skin contact, wash immediately with soap and water. If severe skin contact, treat patient for oral or inhalation exposure. Exposed eyes should be flushed copiously with water for at least 15 minutes. If the victim stops breathing before emergency medical treatment is available, give artificial respiration or oxygen, but avoid mouth to mouth respiration; also avoid contact with contaminated skin (Gosselin 1984, p. III-127; *Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROMETHYL ETHER

CAS Registry Number: 542-88-1

Synonyms: Bis(Chloromethyl) Ether; 1,1'-Dichlorodimethyl Ether; alpha,alpha'-Dichlorodimethyl Ether; BCME; bis-CME; Chloro(chloromethoxy) Methane; Dichlorinated Methyl Oxide; Dichlorodimethyl Ether; Dichloromethyl Ether; Dimethyl-1,1'-Dichloroether; Ether, bis(Chloromethyl); Monochloromethyl Ether; Oxybis(Chloromethane); Sym-Dichloro-Dimethyl Ether; Sym-Dichloromethyl Ether; Methane, Oxybis(chloro-

Chemical Formula: $C_2H_4Cl_2O$

Molecular Weight: 114.97

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.025 mg/liter/6 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds) (statutory)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 223°F, 106°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.315 at 20°C (*Merck 1976)

Vapor Pressure (mmHg): 30 at 22°C (*Callahan 1979)

Melting Point: -42.7°F, -41.5°C (*Weast 1979)

Vapor Density (AIR=1): 4.0 (*Sax 1968)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not soluble; decomposes (Weast 1979, p. C-300)

CHLOROMETHYL ETHER

SECTION II (continued)

Appearance and Odor: Colorless liquid (*Merck 1976) with extremely suffocating odor (*Sittig, 1981).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Occupational carcinogen, no permissible exposure limit (NIOSH 1987, Appendix C)

ACGIH TLV: TWA 0.001 ppm (0.005 mg/m^3) (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: Human carcinogen -- recommended TLV 0.001 ppm (ACGIH 1984, p. 40).

Routes of Entry: **Inhalation:** Yes (Sax 1985, p. 463)
Skin: Yes (Sax 1985, p. 463)
Ingestion: Yes (Sax 1985, p. 463)

Health Hazards (Acute, Delayed, and Chronic): Acute toxicity is high by ingestion, inhalation, and skin irritation. Small quantities may cause death or permanent injury after very short exposure (*Sax 1968). Chloromethyl ether is an alkylating agent which is a recognized human carcinogen. There is a strong association between industrial exposure and excess lung cancer (*Sittig 1981; *NIOSH 1984; *IARC 1972-85).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Less than 19°C (*Bretherick 1979)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (*DOT 1984).

Unusual Fire and Explosion Hazards: Container may explode in heat of fire (*DOT 1984).

NFPA Flammability Rating: Not Found

CHLOROMETHYL ETHER

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Merck 1976)
Stable:

Conditions to Avoid: Avoid decomposing heat (Sax 1985, p. 63), powerful oxidizers, areas of high fire hazard (*Sax 1975), and moist air (*Merck 1976).

Incompatibility (Materials to Avoid): Water: hydrolyzes very rapidly (half life 10-40 seconds) on contact with water (*Callahan 1979).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of chlorides (Sax 1985, p. 463). Decomposed by water to hydrochloric acid and formaldehyde (*Merck 1976).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a research chemical and lab reagent (*Hawley 1977; *SRI). Not produced commercially in the U.S. (*SRI), but was formerly used for chloromethylation in industry (*ACGIH 1980). Has been used as an alkylating agent in the manufacture of polymers (*Sittig 1981). May be produced as chemical intermediate (*IARC 1972 - present).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Spill or leak: do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spills for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CHLOROMETHYL ETHER

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Vapor is severly irritating to the skin and mucous membranes and may cause cornea damage which may heal slowly (*Sittig 1981).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHYLTHIOCYANATE

CAS Registry Number: 542-90-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 743) Thiocyanic Acid, Ethyl Ester; Ethane, Thiocyanato-; Ethyl Rhodanate; Ethyl Sulfocyanate

Chemical Formula: C_3H_5NS

Molecular Weight: 87.15

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (cat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 295°F, 146°C (Merck 1983, p. 1336)

Specific Gravity (H_2O=1): 1.007 at 23°C/4°C (Merck 1983, p. 1336)

Vapor Pressure (mmHg): Not Found

Melting Point: -122°F, -85.5°C (Weast 1983, p. C-515)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Merck 1983, p. 1336)

Appearance and Odor: Liquid (Merck 1983, p. 1336).

ETHYLTHIOCYANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1394)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic if ingested (Sax 1984, p. 1394).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of oxides of nitrogen and sulfur (Sax 1984, p. 1394).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

ETHYLTHIOCYANATE

SECTION V (continued)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of oxides of nitrogen and sulfur (Sax 1984, p. 1394).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is an agricultural insecticide (Gosselin 1981, p. II-288).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. For small spills, absorb with sand or other noncombustible absorbent material and place into containers for later disposal. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Toxicity hazard similar to thiocyanate (Sax 1984, p. 1394). Prolonged absorption may produce various skin eruptions, runny nose, and occasionally dizziness, cramps, nausea, vomiting and mild or severe disturbances of the nervous system (Sax 1984, p. 2568). Ethyl thiocyanate is an aliphatic thiocyanate (Gosselin 1981, p. II-288). Aliphatic thiocyanates have the following signs and symptoms. The ingestion of a concentrated solution may lead to vomiting. The principal systemic reaction is probably one of central nervous depression, interrupted by periods of restlessness, abnormally fast and deep respiratory movements and convulsions. Death is usually due to respiratory arrest from paralysis of the medullary centers. In nonfatal cases injuries to the liver and kidneys may appear (Gosselin 1981, p. III-16).

Emergency and First Aid Procedures: Treatment is as for aliphatic thiocyanates (Gosselin 1981, p. II-288). Because cyanide is probably largely responsible for poisonings, antidotal measures against cyanide should be instituted promptly (Gosselin 1981, p. III-16). First aid for

ETHYLTHIOCYANATE

SECTION IX (continued)

cyanide includes moving the victim to fresh air. 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Hayes 1982
NFPA 1984
Farm Chemicals Handbook 1984
Buchel 1983
Hawley 1981
DASE 1980
Verschueren 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIS(2-CHLOROETHYL)AMINE

CAS Registry Number: 555-77-1

Synonyms: (SANSS 1983 SYNONYMS) Triethylamine, 2,2',2"-Trichloro-; Trichlormethine; Tri-(2-Chloroethyl)Amine; 2,2',2"-Trichlorotriethylamine; Tris(beta-chloroethyl)amine; TS 160; Ethanamine, 2-Chloro-N,N-bis (2-Chloroethyl)-; HN 3; TL 145; 2-Chloro-N,N-bis(2-Chloroethyl) Ethanamine

Chemical Formula: $C_6H_{12}Cl_3N$

Molecular Weight: 204.54

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse) 0.35 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 493°F, 256°C calculated, decomposes (U.S. Army 1975, p. 3-10)

Specific Gravity (H_2O=1): 1.2347 (Merck 1979, p. 1379)

Vapor Pressure (mmHg): 0.0109 at 25°C (U.S. Army 1975, p. 3-10)

Melting Point: 25°F, -4°C (Weast 1979, p. C-110)

Vapor Density (AIR=1): 7.1 (U.S. Army 1975, p. 3-10)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (Weast 1979, p. C-110)

TRIS(2-CHLOROETHYL)AMINE

SECTION II (continued)

Appearance and Odor: Liquid with faint odor of fish and soap (Merck 1983, p. 1379); no odor when pure (U.S. Army 1975, p. 3-10)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2691)
Skin: Yes (Sax 1984, p. 2691)
Ingestion: Yes (Sax 1984, p. 2691)

Health Hazards (Acute, Delayed, and Chronic): Most toxic of the nitrogen mustards. The median lethal dose for inhalation is 1,500 mg-min/m^3; for skin absorption (masked personnel) is 10,000 mg-min/m^3. The medium incapacitating dose for eye injury is 200 mg-min/m^3; for skin absorption is 2,500 mg-min/m^3 (U.S. Army 1975, p. 3-10).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): High enough not to interfere with military use of the agent (U.S. Army 1975, p. 3-10).
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (U.S. Army 1975, p. 3-10)

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2691)

TRIS(2-CHLOROETHYL)AMINE

SECTION V (continued)

Incompatibility (Materials to Avoid): No action on metals or other materials if material is kept dry (U.S. Army 1975, p. 3-10); otherwise, no information found.

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits chloride and nitrogen oxides (Sax 1984, p. 2691).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Delayed-action casualty military agent (U.S. Army 1975, p. 3-10).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). (Non-Specific -- Poisonous Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Irritates the eyes in quantities which do not significantly damage the skin or respiratory tract, insofar as single exposures are concerned. After mild vapor exposure, there may be no skin lesions. After severe vapor exposures, or after exposure to the liquid, erythema may appear. Irritation and itching may occur. Later, blisters

TRIS(2-CHLOROETHYL)AMINE

SECTION IX (continued)

may appear in the erythematous areas. Effects on the respiratory tract include irritation of the nose and throat, hoarseness progressing to loss of voice, and a persistent cough. Fever, labored respiration, and moist rales develop. Bronchial pneumonia may appear after the first 24 hours. Following ingestion or systemic absorption, material causes inhibition of cell mitosis, resulting in depression of the blood-forming mechanism and injury to other tissues. Severe diarrhea, which may be hemorrhagic, occurs. Lesions are most marked in the small intestine and consist of degenerative changes and necrosis in the mucous membranes. Ingestion of 2 to 6 milligrams causes nausea and vomiting (U.S. Army 1975, p. 3-11).

Emergency and First Aid Procedures: (Non-Specific -- Nitrogen Mustards) Stop exposure and treat symptomatically (Gilman 1985, p. 1257). (Non-Specific -- Poisonous Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

NFPA 1984
Hawley 1981
Student 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL ISOTHIOCYANATE

CAS Registry Number: 556-61-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 676) Methane, Isothiocyanato-; Isothiocyanatomethane; Isothiocyanic Acid, Methyl Ester; Methyl Mustard Oil; MIC; MIT; MITC; Morton EP-161E; Trapex; Trapexide; Vorlex; Vortex; WN 12

Chemical Formula: C_2H_3NS

Molecular Weight: 73.12

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} dermal (rabbit) 33 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 246°F, 119°C (Sax 1984, p. 1866)

Specific Gravity (H_2O=1): 1.069 at 37°C/4°C (Weast 1983, p. C-376)

Vapor Pressure (mmHg): Not Found

Melting Point: 95-97°F, 35-36°C (Sax 1984, p. 1866)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (Sax 1984, p. 1866)

Appearance and Odor: Crystalline (Sax 1984, p. 1866)

METHYL ISOTHIOCYANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Farm Chemicals Handbook 1984, p. C-242)
Skin: Yes (Farm Chemicals Handbook 1984, p. C-242)
Ingestion: Yes (NIOSH/RTECS 1983, p. 676)

Health Hazards (Acute, Delayed, and Chronic): Very toxic; probable human oral lethal dose is 50-500 mg/kg, or between 1 teaspoonful and 1 oz. for a 70 kg (150 lb.) person (Gosselin 1984, p. II-352). Highly irritating to skin, mucous membrances, and eyes (Sax 1984, p. 1866). Human oral minimum lethal dose: approximately 1 g/kg (NIOSH/RTECS 1983, Volume 2, p. 676).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Move container from area if you can do so without risk. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: (Non-Specific -- Pesticide, Solid, n.o.s.) This material may burn, but does not ignite readily. Fire may produce irritating or poisonous gases (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Do not store below -20°C or at elevated temperatures. Keep away from sparks (Farm Chemicals Handbook 1984, p. C-242).

METHYL ISOTHIOCYANATE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated it emits very dangerous cyanides and sulfur compounds (Sax 1984, p. 1866).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a soil fumigant. A mixture of methyl isothiocyanate and chlorinated C3 hydrocarbons is used as a soil fumigant for control of weeds, fungi, insects, and nematodes (Farm Chemicals Handbook 1984, pp. C230, C242).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Extreme irritation of eyes, mucous membranes, and skin. Coughing and other symptoms of extreme pulmonary irritation would be expected if vapors are inhaled (Sax 1984, p. 1866).

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) 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 (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL THIOCYANATE

CAS Registry Number: 556-64-9

Synonyms: Thiocyanic Acid, Methyl Ester; Thiocyanatomethane; Methyl Rhodanate; Methyl Sulfocyanate

Chemical Formula: C_2H_3NS

Molecular Weight: 73.12

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (cat) 8.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 266-271°F, 130-133°C (Sax 1984, p. 1934)

Specific Gravity (H_2O=1): 1.068 at 25°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): 10.00 at 21.6°C (Perry, 1984, p. 3-58)

Melting Point: -60°F, -51°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very slight (*Merck 1976)

Appearance and Odor: Colorless liquid, onion odor (*Merck 1976)

METHYL THIOCYANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic if ingested (Sax 1984, p. 1934). It is a rapidly acting poison (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorities (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of oxides of nitrogen and sulfur (Sax 1984, p. 1934).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

METHYL THIOCYANATE

SECTION V (continued)

Conditions to Avoid: This material is volatile (*Gosselin 1976)

Incompatibility (Materials to Avoid): (Non-Specific -- Thiocyanates) Incompatible with nitric acid. Violent reactions have occurred when mixed with chlorates, nitrates, nitric acid, organic peroxides, peroxides, potassium chlorate, and sodium chlorate (Sax 1984, p. 2568).

Hazardous Decomposition or Byproducts: When heated to decomposition it emits very toxic fumes of oxides of nitrogen and sulfur (Sax 1984, p. 1934).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an agricultural insecticide, a fumigant (*Gosselin 1976), and as a research chemical. No evidence of commercial production in the U.S. (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). (Non-Specific -- Pesticide, Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. For small spills, absorb with sand or other noncombustible absorbent material and place into containers for later disposal. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Thiocyanates) Prolonged absorption may produce various skin eruptions, runny nose, and occasionally, dizziness, cramps, nausea, vomiting and mild or severe disturbances of the nervous system (Sax 1984, p. 2568). (Non-Specific -- Aliphatic Thiocyanates) The ingestion of a concentrated solution may lead to vomiting. The principal systemic reaction is probably one of central

METHYL THIOCYANATE

SECTION IX (continued)

nervous system depression, interrupted by periods of restlessness, abnormally fast and deep respiratory movements and convulsions. Death is usually due to respiratory arrest from paralysis of the medullary centers. In nonfatal cases injuries to the liver and kidneys may appear (Gosselin 1981, p. III-16).

Emergency and First Aid Procedures: (Non-Specific -- Aliphatic Thiocyanates) Because cyanide is probably largely responsible for poisonings, antidotal measures against cyanide should be instituted promptly (Gosselin 1981, p. III-16). (Non-Specific -- Cyanide Solution) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHANESULFONYL FLUORIDE

CAS Registry Number: 558-25-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 684) Fumette; Methanesulphonyl Fluoride; MSF

Chemical Formula: CH_3FO_2S

Molecular Weight: 98.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rat) 0.14 mg/liter (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 255°F, 124°C at 760 mmHg (Aldrich, 1986, p. 853)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

METHANESULFONYL FLUORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1764)
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Highly toxic when inhaled (Sax 1984, p. 1764).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of fluorides and sulfur oxides (Sax 1984, p. 1764).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of fluorides and sulfur oxides (Sax 1984, p. 1764).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

METHANESULFONYL FLUORIDE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Weast 1979
DOT 1984
ACGIH 1984
NIOSH/OSHA 1978
Weiss 1980
Merck 1983
Buchel 1983
Encyc Occupat Health and Safety 1983
Farm Chemicals Handbook 1984
Hawley 1981
Clayton and Clayton 1981-82
Verschueren 1983
Student 1981
NFPA 1984
Gosselin 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHION

CAS Registry Number: 563-12-2

Synonyms: Phosphorodithioic Acid, S,S'-Methylene O,O,O',O'-Tetraethyl Ester; AC 3422; Bis(S-(Diethoxyphosphinothioyl)Mercapto)Methane; Bladan; Diethion; Embathion; ENT 24,105; Ethanox; Ethiol; Ethiol 100; Ethodan; Ethopaz; Ethyl Methylene Phosphorodithioate; FMC-1240; Fosfatox E; Fosfono 50; Hylemax; Hylemox; Itopaz; KWIT; NIA 1240; Niagara 1240; Nialate; O,O,O',O'- Tetraethyl S,S'-Methylene Di(Phosphorodithioate); O,O,O',O'-Tetraethyl S,S'-Methylenebisphosphordithioate; O,O,O',O'-Tetraethyl S,S'-Methylenebisphosphorodithioate; O,O,O,O-Tetraethyl S,S'-Methylenebis (Dithiophosphate); Phosphorodithioic Acid, O,O-Diethyl Ester, S,S-Diester with Methanedithiol; Phosphorodithioic Acid, S,S'-Methylene O,O,O',O'-Tetraethyl Ester; Phosphotox E; Rhodiacide; Rhodocide; Rodocid; Rodocide; RP 8167; S,S'-Methylene O,O,O',O'-Tetraethyl Phosphorodithioate; Soprathion; Tetraethyl S,S'-Methylene Bis(Phosphorothiolothionate); Vegfru Fosmite

Chemical Formula: $C_9H_{22}O_4P_2S_4$

Molecular Weight: 384.48

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 13 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.215-1.230 at 20°C/4°C (*Worthing 1979)

Vapor Pressure (mmHg): 0.0000015 at 77°F, 25°C (*Worthing 1979)

Melting Point: 9-10°F, -12 - -13°C (*Merck 1983)

ETHION

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (*Merck 1983)

Appearance and Odor: Colorless to amber-colored liquid (*Worthing 1979); odorless (*Farm Chemicals Handbook 1984) or very disagreeable odor (*ACGIH 1980)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.4 mg/m^3 (skin) (*ACGIH 1984)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is very toxic; the probable oral lethal dose for humans is 50-500 mg/kg, which is between one teaspoonful and one ounce for a 150-lb person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Does not ignite easily (*DOT 1984)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Move containers from fire area if it can be done without risk. Dike fire control water for later disposal, do not scatter the material. Fight fire from maximum distance. Wear positive pressure breathing apparatus and protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Shock can shatter the container, releasing the contents (*Sax 1979). Fire may produce irritating or poisonous gases (*DOT 1984).

NFPA Flammability Rating: Not Found

ETHION

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Worthing 1979)
Stable:

Conditions to Avoid: Slowly oxidized in air (*Worthing 1979)

Incompatibility (Materials to Avoid): Hydrolyzed by acids and alkalies (*Worthing 1979)

Hazardous Decomposition or Byproducts: Decomposes above 302°F, 150°C (*Sunshine 1969). When heated to decomposition it emits highly toxic fumes of oxides of sulfur and phosphorus (Sax 1984, p. 1372).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide and acaricide for citrus fruit, apples, nuts, other fruit, and cotton (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Do not touch spilled material. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material. Large spills should be diked far ahead of the spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

ETHION

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, weakness, muscle twitching, difficult breathing, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (*Gosselin 1976).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin and eyes with running water for at least 15 minutes. 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 (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SEMICARBAZIDE HYDROCHLORIDE

CAS Registry Number: 563-41-7

Synonyms: Amidourea Hydrochloride; Aminourea Hydrochloride; Carbamylhydrazine Hydrochloride; Hydrazinecarboxamide Monohydrochloride; Hydrazinecarboxamide, Hydrochloride; Hydrazinecarboxamide, Monohydrochloride; Semicarbazide Chloride; Semicarbazide, Monohydrochloride

Chemical Formula: $CH_5N_3O \cdot HCl$

Molecular Weight: 111.54

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 342-347°F, 172-175°C (Hawley 1981, p. 914); decomposes at 347-365°F, 175-185°C (Merck 1983, p. 1214)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble in water with acid reaction (*Merck 1976)

SEMICARBAZIDE HYDROCHLORIDE

SECTION II (continued)

Appearance and Odor: Snow white crystals (*Hawley 1977)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Hawley 1981, p. 914)

Health Hazards (Acute, Delayed, and Chronic): Toxic by ingestion (Hawley 1981, p. 914).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Solid, n.o.s.) This material may burn, but does not ignite readily. For small fires use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and hydrogen chloride (Sax 1984, p. 2392).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

SEMICARBAZIDE HYDROCHLORIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits very toxic fumes of nitrogen oxides and hydrogen chloride (Sax 1984, p. 2392).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

As a reagent for ketones and aldehydes with which it affords crystalline compounds having characteristic melting points (Merck 1983, p. 1214).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Solid, n.o.s.) Isolate hazard area. Stay upwind; keep out of low areas. Do not touch spilled material. Absorb small spills with sand or other noncombustible absorbent material and place into containers for later disposal. Take up small, dry spills with clean shovel; place material into clean, dry container and cover; move containers from spill area. Dike far ahead of large spills for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TOLUENE 2,4-DIISOCYANATE

CAS Registry Number: 584-84-9

Synonyms: 2,4-Dicyanato-1-Methylphenylene; 2,4-Diisocyanato-1-Methylbenzene; 2,4-Diisocyanatotoluene; 2,4-TDI; 2,4-Toluene Diisocyanate; 2,4-Toluenediisocyanate; 2,4-Toluylene Diisocyanate; 2,4-Tolylene Diisocyanate; 2,4-Tolylenediisocyanate; 4-Methyl-m-Phenylene Diisocyanate; 4-Methyl-m-Phenylene Isocyanate; 4-Methyl-Phenylene Diisocyanate; 4-Methyl-Phenylene Isocyanate; Benzene, 2,4-Diisocyanato-1-Methyl; Desmodur T80; Di-Iso-Cyanatoluene; Hylene T; Hylene TCPA; Hylene TLC; Hylene TM; Hylene TM-65; Hylene TRF; Isocyanic Acid, 4-Methyl-m-Phenylene Ester; Isocyanic Acid, Methylphenylene Ester; Meta-Toluene Diisocyanate; Mondur TD; Mondur TD-80; Mondur TDS; Nacconate 100; NCI-C50533; Niax TDI; Niax TDI-P; Rubinate TDI 80/20; TDI; TDI-80; Toluene Diisocyanate; Toluene, 2,4-Diisocyanato-; Toluene-2,4-Diisocyanate; Toluylene-2,4-Diisocyanate; Tolyene 2,4-Diisocyanate; Tolyene-2,4-Diisocyanate; Tolylene Diisocyanate; Tolylene-2,4-Diisocyanate

Chemical Formula: $C_9H_6N_2O_2$

Molecular Weight: 174.15

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rabbit) 0.011 mg/liter/3 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 484°F, 251°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.2244 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 1 at 80°C (*Clayton and Clayton 1981-82)

Melting Point: 67.1-70.7°F, 19.5-21.5°C (*Merck 1983)

TOLUENE 2,4-DIISOCYANATE

SECTION II (continued)

Vapor Density (AIR=1): 6.0 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Reacts with water evolving carbon dioxide (Merck 1983, p. 1364).

Appearance and Odor: Colorless, yellow or dark liquid or solid with a sweet, fruity, pungent odor (NIOSH/OSHA 1978, p. 180).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 0.02 ppm (0.14 mg/m^3) (NIOSH/OSHA 1978, p. 180)

ACGIH TLV: TWA 0.005 ppm (0.04 mg/m^3); STEL 0.02 ppm (0.15 mg/m^3) (*ACGIH 1984)

IDLH: 10 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: NIOSH: 0.035 mg/m^3 10-hour TWA; 0.14 mg/m^3 10-minute ceiling (NIOSH 1987, p. 226)

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 180)
Skin: Yes (NIOSH/OSHA 1978, p. 180)
Ingestion: Yes (NIOSH/OSHA 1978, p. 180)

Health Hazards (Acute, Delayed, and Chronic): Can cause death. Contact with skin may cause allergic eczema. Substance is very corrosive to eyes. Chronic exposure may cause chronic lung disease (*Gosselin 1976, Weiss 1980, p. 871, DASE 1980, p. 907). As a vapor TDI is a powerful irritant to the respiratory tract. Chronic loss of respiratory function may occur (*Gosselin 1976). Acute asthmatic bronchitis or frank asthma may occur (*IARC 1972-85). A splash in the eyes of workmen has caused keratitis and conjunctivitis (*Grant 1974). This compound causes inflammation of the skin, also chemical pneumonitis and pulmonary edema (*ACGIH 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 270°F, 132°C (*Merck 1983)
Flammable Limits:
LEL: 0.9% (*NFPA 1978)
UEL: 9.5% (*NFPA 1978)

Extinguishing Methods: Water gently applied to surface or foam may cause frothing which will extinguish the fire (*NFPA 1978). If material is on fire or involved in fire do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol"

TOLUENE 2,4-DIISOCYANATE

SECTION IV (continued)

foam, carbon dioxide or dry chemical. Use water spray to absorb vapor (Student 1981, p. 503).

Special Fire Fighting Procedures: If water gets below the surface of the liquid, it will turn to steam and cause frothing. Full protective clothing, including self-contained breathing apparatus, rubber gloves, boots and bands around legs, arms, and waist should be provided. No skin surface should be exposed (*NFPA 1978). Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 57).

Unusual Fire and Explosion Hazards: When heated to decomposition it emits very toxic fumes of cyanide and nitrogen oxides (Sax 1984, p. 2590). Reacts violently with amines, alcohol, bases and warm water causing fire and explosion hazards (DASE 1980, p. 907).

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 871)

Conditions to Avoid: Avoid heating (*NFPA 1978).

Incompatibility (Materials to Avoid): Strong oxidizers, water, acids, bases, amines, etc., cause foam and splatter (NIOSH/OSHA 1978, p. 180)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of cyanide and nitrogen oxide (Sax 1984, p. 2590).

Hazardous Polymerization: **May Occur:** Yes (*Merck 1983)
May Not Occur:

Conditions to Avoid: Concentrated alkaline compound such as sodium hydroxide or tertiary amines may cause run-away polymerization (*Merck 1983). Slow, not hazardous polymerization may occur above 113°C (*CHRIS 1978).

SECTION VI -- USE INFORMATION

Polyurethane foams; coatings in floor and wood finishes; sealers; paints; concrete sealers for aircraft and tank trucks; elastomers in clay pipe seals (*IARC 1972-1985); elastomers and coatings; and cross-linking agent for nylon (Hawley 1981, p. 1030).

TOLUENE 2,4-DIISOCYANATE

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources; no smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them (DOT 1984, Guide 57).
If material is not on fire and not involved in fire; keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary; attempt to stop leak if without hazard. Use water spray to knock down vapors. If material is leaking (not on fire), downwind evacuation must be considered (Student 1981, p. 503).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TOLUENE 2,4-DIISOCYANATE

(584-84-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless to yellow liquid or solid below 19.5 degrees C (67.1 degrees F); darkens on exposure to sunlight.

Odor - Sharp, pungent.

Commercial Form - Colorless to light yellow liquid.

Uses - Chemical intermediate; cross-linking agent for nylon; manufacture of polyurethane foams, sealers, paints, elastomers, and coatings.

Materials to Avoid - Water (except for use in emergency life support).

Caution: *Mixing with water may result in a violent reaction. Sources of extreme heat or ignition including sparks or fire may result in formation of toxic nitrogen oxide gases.*

Other Names - Desmodur T80; Hylene T; Mondur TD; Nacconate 100; Niax TDI; 2,4-TDI; TDI.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Toluene 2,4-Diisocyanate Exposure:

Signs and symptoms of acute exposure to toluene 2,4-diisocyanate may be severe and include burning of the skin, eyes, nose, and throat. Cough, laryngitis, chest pain, tightness of the chest, bronchitis, asthma, emphysema, and enlargement of the right side of the heart may also occur. Gastrointestinal effects may include vomiting, diarrhea, and abdominal pain. Headache, insomnia, euphoria, depression, anxiety, paranoia, neuroses, and ataxia (incoordination) may also be noted.

TOLUENE 2,4-DIISOCYANATE

Emergency Life-Support Procedures:

Acute exposure to toluene 2,4-diisocyanate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to toluene 2,4-diisocyanate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to toluene 2,4-diisocyanate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

TOLUENE 2,4-DIISOCYANATE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PERCHLOROMETHYLMERCAPTAN

CAS Registry Number: 594-42-3

Synonyms: Trichloromethanesulfenyl Chloride; (Trichloromethyl)Sulfenyl Chloride; Clairsit; Methanesulfenic Acid, Trichloro-, Chloride; Methanesulfenyl Chloride, Trichloro-; PCM; Perchloro-Methyl-Mercaptan; Perchloromethanethiol; Perchloromethyl Mercaptan; PMM; Thiocarbonyl Tetrachloride; Trichloromethanesulphenyl Chloride; Trichloromethylsulfenyl Chloride; Trichloromethylsulphenyl Chloride

Chemical Formula: CCl_4S

Molecular Weight: 185.87

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.296 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 297-298°F, 147-148°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.6947 at 20°C (*ACGIH 1980)

Vapor Pressure (mmHg): 25 at 51°C (Weast 1984, p. C-374)

Melting Point: Not Found

Vapor Density (AIR=1): 6.414 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*ACGIH 1980)

PERCHLOROMETHYLMERCAPTAN

SECTION II (continued)

Appearance and Odor: Oily, yellow (*ACGIH 1980) to orange-red liquid (*CHRIS 1978). Odor is intensely unpleasant; strong, unbearable, acrid (*CHRIS 1978).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 ppm (0.8 mg/m^3) (NIOSH 1987, p. 186)

ACGIH TLV: TWA 0.1 ppm (0.8 mg/m^3) (*ACGIH 1980)

IDLH: 10 ppm (NIOSH/OSHA 1978, p. 150)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*CHRIS 1978)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): May cause death or permanent injury after short exposure to small quantities (*Sax 1975); strong irritant to eyes and skin (*Hawley 1977). Inhalation may cause severe irritation of the upper respiratory tract. It also is a strong irritant to the eyes and skin. Brief exposure to lower concentrations may produce central nervous system depression and lung, liver, and heart congestion. Severe exposures may be fatal. Exposure of eyes may lead to severe conjunctivitis or corneal damage. The liquid is irritating to the skin, and may be absorbed through the skin in quantities sufficient to cause general toxic effects. Ingestion may cause damage to mucous membranes and result in pain and burning of the mouth and throat, nausea, vomiting, cramps, and diarrhea. In severe cases, tissue ulceration and CNS depression may occur (*CHRIS 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is neither flammable nor a serious fire hazard, although it will support combustion (*ACGIH 1980). Fight small fires with dry chemical, carbon dioxide, water spray, or foam, and large fires with water spray, fog, or foam. Move containers containing this compound away from fire area if possible (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Positive pressure breathing apparatus and special protective clothing should be worn (DOT 1984, Guide 55).

PERCHLOROMETHYLMERCAPTAN

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Very irritating vapors formed from hot material; may form phosgene gas, hydrogen chloride, and sulfur dioxide (Weiss 1980, p. 739).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 739)

Conditions to Avoid: Reacts with water only when hot to give carbon dioxide, hydrochloric acid, and sulfur (Weiss 1980, p. 739).

Incompatibility (Materials to Avoid): Reacts with iron or steel, evolving carbon tetrachloride. Corrosive to most metals (Weiss 1980, p. 739).

Hazardous Decomposition or Byproducts: At high temperatures this compound will decompose to carbon tetrachloride, sulfur chloride, heavy oil polymers, phosgene gas, hydrogen chloride, and sulfur dioxide (Weiss 1980, p. 739).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 739)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This compound is used as a fumigant, dye intermediate, and in other organic syntheses (*ACGIH 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if this can be done without risk. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material and place into containers for later disposal. For large spills dike far ahead of spill for later disposal. It may be necessary to seek emergency assistance (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PERCHLOROMETHYLMERCAPTAN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PERCHLOROMETHYLMERCAPTAN

(594-42-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Oily, yellow to orange-red liquid.

Odor - Intensely unpleasant.

Commercial Form - 97% pure liquid.

Uses - Fumigant, manufacture of dyes and pesticides.

Materials to Avoid - Iron, steel, water (except for use in emergency life support).

Caution: *Avoid sources of heat including fire. Perchloromethylmercaptan will liberate carbon tetrachloride, phosgene, and hydrogen chloride fumes when heated to decomposition.*

Other Names - Clairsit, perchloromethanethiol, trichloromethanesulfenyl chloride, thiocarbonyl tetrachloride, trichloromethyl sulfur chloride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Perchloromethylmercaptan Exposure:

Signs and symptoms of acute exposure to perchloromethylmercaptan may lead to liver, heart, and kidney damage. Respiratory effects include coughing, dyspnea (shortness of breath), painful breathing, and lung congestion. Tachycardia (rapid heart rate) is often observed. Nausea, vomiting, abdominal cramping, and diarrhea may also occur. Contact with perchloromethylmercaptan may result in severe dermatitis (red, inflamed skin), conjunctivitis (red, inflamed eyes), and burns with ulceration and severe pain.

PERCHLOROMETHYLMERCAPTAN

Emergency Life-Support Procedures:

Acute exposure to perchloromethylmercaptan may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to perchloromethylmercaptan.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to perchloromethylmercaptan.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. THOROUGHLY wash exposed skin areas with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

PERCHLOROMETHYLMERCAPTAN

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TETRAETHYLTIN

CAS Registry Number: 597-64-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 634) Stannane, Tetraethyl-; Tetraethylstannane; Tin, Tetraethyl; TET

Chemical Formula: $C_8H_{20}Sn$

Molecular Weight: 234.97

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rabbit) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 358°F, 181°C (Weast 1979, p. C-717)

Specific Gravity (H_2O=1): 1.187 at 23°C (Weast 1979, p. C-717)

Vapor Pressure (mmHg): Not Found

Melting Point: -170°F, -112°C (Weast 1979, p. C-717)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1979, p. C-717)

Appearance and Odor: Colorless liquid (Weast 1979, p. C-717).

TETRAETHYLTIN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Tin, organic compounds) TWA: 0.1 mg/m^3, as tin (NIOSH 1987, p. 224)

ACGIH TLV: (Tin, organic compounds) 0.1 mg/m^3, as tin (skin) (ACGIH, 1986-87, p. 31)

IDLH: Not Found

Other Limits Recommended: (Non-Specific -- Organic Tin Compounds) NIOSH recommended standard: Air: TWA 0.1 mg (tin)/m^3; IDLH for tin compounds, organic, 200 mg/m^3 (NIOSH/OSHA 1978, p. 180).

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 2527)
Ingestion: Yes (Sax 1984, p. 2527)

Health Hazards (Acute, Delayed, and Chronic): Toxic hazard rating is high for oral, intravenous, intraperitoneal administration (Sax 1984, p. 2527). This material causes swelling of the brain and spinal cord (Hayes 1982, p. 37).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This is a liquid organotin pesticide (Hayes 1982, p. 37). This material may burn but does not ignite readily. Extinguish small fires with dry chemical, carbon dioxide, water spray or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This is a liquid organotin pesticide (Hayes 1982, p. 37). Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2527).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

TETRAETHYLTIN

SECTION V (continued)

Incompatibility (Materials to Avoid): (Non-Specific -- Organic Tin Compounds) Strong oxidizers (NIOSH/OSHA 1978, p. 180)

Hazardous Decomposition or Byproducts: Acrid smoke and fumes are emitted upon decomposition by heat (Sax 1984, p. 2527).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

(Non-Specific -- Organotin Compounds) Used as biocides, bactericides, fungicides and insecticides; preservatives for wood, textile, paper, and leather (Clayton and Clayton 1981-82, p. 1953). Not registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This is a liquid organotin pesticide (Hayes 1982, p. 37). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Tetrasubstituted Tin Compound) Exposure may result in muscular weakness and paralysis, leading to respiratory failure; convulsive movements; closure of eyelids and sensitivity to light (Clayton and Clayton 1981-82, p. 1955); headaches, and EEG changes (Doull 1980, p. 458); dizziness, psychological and neurological disturbances, sore throat, cough, abdominal pain, nausea, and vomiting (NIOSH/OSHA 1978, p. 181).

TETRAETHYLTIN

SECTION IX (continued)

Emergency and First Aid Procedures: This is a liquid organotin pesticide (Hayes 1982, p. 37). Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 13, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THIOUREA, (2-METHYLPHENYL)-

CAS Registry Number: 614-78-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 890) Urea, 2-Thio-1-o-Tolyl-; o-Tolyl Thiourea; 1-o-Tolyl-2-Thiourea

Chemical Formula: $C_8H_{10}N_2S$

Molecular Weight: 166.26

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 304-306°F, 151-152°C (Sax 1984, p. 2601); 324°F, 162°C (Weast 1984, p. C-539)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble (Weast 1979, p. C-540)

Appearance and Odor: Crystalline solid (Sax 1984, p. 2601)

THIOUREA, (2-METHYLPHENYL)-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2601)

Health Hazards (Acute, Delayed, and Chronic): The material is highly toxic if orally ingested (Sax 1984, p. 2601).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Solid, n.o.s.) For small fires use dry chemical, carbon dioxide, water spray, or foam. Use water spray, fog, or foam on larger fires. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of oxides of nitrogen and sulfur (Sax 1984, p. 2601).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of oxides of nitrogen and sulfur (Sax 1984, p. 2601).

THIOUREA, (2-METHYLPHENYL)-

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Solid, n.o.s.) Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Do not touch spilled material, stop leak if you can do so without risk. Absorb small spills with sand or other noncombustible material and place into containers for later disposal. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air and call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with the material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978

THIOUREA, (2-METHYLPHENYL)-

COMMENTS (continued)

Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Gilman 1985
Verschueren 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL ISOCYANATE

CAS Registry Number: 624-83-9

Synonyms: Isocyanic Acid, Methyl Ester; MIC; Iso-Cyanatomethane; Isocyanatomethane; Methane, Isocyanato-

Chemical Formula: C_2H_3NO

Molecular Weight: 57.05

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.012 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 102°F, 39°C (NIOSH/OSHA 1978, p. 130)

Specific Gravity (H_2O=1): 0.9599 at 20°C/20°C (*Sax 1979)

Vapor Pressure (mmHg): 348 at 20°C (*ACGIH 1980)

Melting Point: -112°F, -80°C (NIOSH/OSHA 1978, p. 130)

Vapor Density (AIR=1): About twice as heavy as air (Worthy 1985, p. 27)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 6.7 g/100 mL (NIOSH/OSHA 1978, p. 130)

Appearance and Odor: Colorless liquid (*Hawley 1981); sharp odor (NIOSH/OSHA 1978, p. 130)

METHYL ISOCYANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA: 0.02 ppm (0.05 mg/m^3) (NIOSH/OSHA 1978, p. 130)

ACGIH TLV: TWA: 0.02 ppm (0.05 mg/m^3) (skin) (ACGIH 1983, p. 26)

IDLH: 20 ppm (NIOSH/OSHA 1978, p. 130)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*NIOSH/RTECS 1985)
Skin: Yes (Sax 1984, p. 1864)
Ingestion: Yes (Dagani 1985, p. 37)

Health Hazards (Acute, Delayed, and Chronic): This compound is a skin irritant and can cause permanent eye damage (*ACGIH 1980). A concentration of 2 ppm has been reported toxic in humans (*NIOSH/RTECS 1985). Methyl isocyanate attacks the respiratory system, eyes and skin. It can injure the lungs and bronchial airways, cause permanent eye damage, and death. Death has been attributed to various forms of respiratory distress (Dagani 1985, p. 38).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 19°F, -7°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 5.3 percent (*NFPA 1978)
UEL: 26 percent (*NFPA 1978)

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 30).

Special Fire Fighting Procedures: Material is extremely hazardous to health but areas may be entered with extreme care. Full protective clothing, including self-contained breathing apparatus (coat, pants, gloves, boots, and bands around legs, arms and waist) should be provided. No skin surface should be exposed (*NFPA 1978). Stay away from ends of tanks. Do not get water inside container. Spray cooling water on containers that are exposed to flames until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 30).

Unusual Fire and Explosion Hazards: Reacts violently with water (*NFPA 1978). Extremely flammable; may be ignited by heat, sparks, or flames. Vapors may travel to a source of ignition and flash back. Container may explode violently in heat of fire. Vapor explosion and poison hazard indoors, outdoors, or in sewers. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 30).

NFPA Flammability Rating: 3

METHYL ISOCYANATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Avoid heat, flame, oxidizers, water (*Sax 1979).

Incompatibility (Materials to Avoid): Water, acids, alkali, amines, iron, tin, copper, and other catalysts (*Sittig 1981).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, pp. 1863-4).

Hazardous Polymerization: **May Occur:** Yes (Worthy 1985, p. 28)
May Not Occur:

Conditions to Avoid: Methyl isocyanate (MIC) will react with water, or in the presence of catalysts (such as sodium hydroxide, sodium methoxide, triphenylarsine, triethyl phosphine, metallic chlorides) to form either a cyclic trimer (trimethyl isocyanurate) or a gummy, resinous polymer. These reactions are exothermic, producing about 540 Btu per pound of MIC. Heat produced in these reactions may result in pressure build up and rupturing of tanks (Worthy 1985, p. 28).

SECTION VI -- USE INFORMATION

Methyl isocyanate is used as an intermediate in the manufacturing of N-methylcarbamate ester and N-methylurea insecticides and herbicides, such as the carbaryl insecticide Sevin, the aldicarb insecticide Termik, additional insecticides carbofuran, methomyl, bendiocarb, and oxamyl, and the herbicides methazole and tebuthiuron (Chem. & Eng. News, December 10, 1984, p. 7).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors, do not get water inside container. Small spills: flush area with flooding amounts of water. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 30). For small quantities, absorb on paper towels. Evaporate in safe place such as a fume hood. Allow sufficient time for vapors to completely clear the hood ductwork. Burn the paper in a suitable location away from combustible materials. Reclaim and atomize large quantities in a combustion chamber with an effluent gas cleaning device. Do not allow this gas to enter a confined space such as a sewer because of the possibility of an explosion (*NIOSH/OSHA 1981).

METHYL ISOCYANATE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Neoprene	POOR/MANY
Viton	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for METHYL ISOCYANATE

(624-83-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Sharp, pungent.

Use - Manufacture of pesticides.

Materials to Avoid - Acids, alkali, metals, water (except for use in emergency life support).

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire. Methyl isocyanate may polymerize violently in the presence of water.*

Other Names - Isocyanatomethane; isocyanic acid, methyl ester; MIC.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, homatropine.

Signs and Symptoms of Acute Methyl Isocyanate Exposure:

Warning: *Effects may be delayed for up to 15 hours. Caution is advised.*

Acute exposure to methyl isocyanate may result in respiratory tract irritation, cough, chest tightness and pain, dyspnea (shortness of breath), asthmatic episodes, and pulmonary edema. Contact with the skin, eyes, and mucous membranes may result in severe irritation and permanent damage.

METHYL ISOCYANATE

Emergency Life-Support Procedures:

Acute exposure to methyl isocyanate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methyl isocyanate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methyl isocyanate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

METHYL ISOCYANATE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

4. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

5. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL DISULFIDE

CAS Registry Number: 624-92-0

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 173): Disulfide, Dimethyl; Dimethyldisulfide

Chemical Formula: $C_2H_6S_2$

Molecular Weight: 94.20

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.0123 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 229.5°F, 109.7°C (Sax 1984, p. 1156)

Specific Gravity (H_2O=1): 1.0569 at 25°C (Sax 1984, p. 1156)

Vapor Pressure (mmHg): 28.6 at 25°C (Sax 1984, p. 1156)

Melting Point: -120.5°F, -84.72°C (Clayton and Clayton 1981-82, p. 2064)

Vapor Density (AIR=1): 3.24 (Sax 1984, p. 1156)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Clayton and Clayton 1981-82, p. 2062)

Appearance and Odor: Liquid (Sax 1984, p. 1156); odor detection limit is 0.33 to 1.2 ppb in water (Clayton and Clayton 1981-82, p. 2087)

METHYL DISULFIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1156)
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): This is highly toxic by inhalation. Health hazards resemble those of sulfides and alkyl disulfides (Sax 1984, p. 1156).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 44.6°F (Sax 1984, p. 1156)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Dimethylsulfide) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 57).

Special Fire Fighting Procedures: (Non-Specific -- Dimethylsulfide) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 57).

Unusual Fire and Explosion Hazards: (Non-Specific -- Dimethylsulfide) May be ignited by heat, sparks or flames. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers (DOT 1984, Guide 57).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

METHYL DISULFIDE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Oxidizing materials (Sax 1984, p. 1156)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of sulfur oxide (Sax 1984, p. 2482). Photochemically, it is oxidized by ozone (Clayton and Clayton 1981-82, p. 2087).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe vapor (see Section III above). (Non-Specific -- Dimethylsulfide) Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 57).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Dimethylsulfides) Move victim to fresh air; 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

METHYL DISULFIDE

SECTION IX (continued)

the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed, keep victim under observation (DOT 1984, Guide 57).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOPROPYL FORMATE

CAS Registry Number: 625-55-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 339) Formic Acid, Isopropyl Ester; NCI-C60106

Chemical Formula: $C_4H_8O_2$

Molecular Weight: 88.12

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 1.4 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 154.8°F, 68.2°C (Weast 1979, p. C-310)

Specific Gravity (H_2O=1): 0.8728 (Weast 1979, p. C-310)

Vapor Pressure (mmHg): 100 at 17.8°C (Sax 1984, p. 1659)

Melting Point: Not Found

Vapor Density (AIR=1): 3.03 (Sax 1984, p. 1659)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (Clayton and Clayton 1981-82, p. 2264)

Appearance and Odor: Clear liquid, pleasant odor (Clayton and Clayton 1981-82, p. 2264)

ISOPROPYL FORMATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Clayton and Clayton 1981-82, p. 2264)
Skin: Yes (Clayton and Clayton 1981-82, p. 2264)
Ingestion: Yes (Sax 1984, p. 1659)

Health Hazards (Acute, Delayed, and Chronic): Vapor produces eye and nose irritation, while the liquid produces eye and skin irritation (Clayton and Clayton 1981-82, p. 2265).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 22°F, -5.6°C (CC) (Clayton and Clayton 1981-82, p. 2264)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. 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 (DOT 1984, Guide 27).

Special Fire Fighting Procedures: Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 27).

Unusual Fire and Explosion Hazards: 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 (DOT 1984, Guide 27).

NFPA Flammability Rating: 3

ISOPROPYL FORMATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Reacts vigorously with oxidizing materials (Sax 1984, p. 1659).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Formic acid, isopropyl ester, is used as a fumigant and as a synthetic raw material (Clayton and Clayton 1981-82, p. 2265).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 27).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	POOR/LIMITED**
Nitrile	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**

ISOPROPYL FORMATE

SECTION VIII (continued)

Viton	POOR/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Ethyl Formate) Inhalation of vapor can cause irritation of eyes and nose. High concentrations can cause unconsciousness in a few minutes, with death within a few hours. Contact with liquid formic acid, isopropyl ester can cause irritation of eyes and skin. Ingestion can result in irritation of the mouth and stomach, with loss of consciousness and death occurring if untreated (Clayton and Clayton 1981-82, p. 2265; Weiss 1980, p. 446).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 27)

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROETHYL CHLOROFORMATE

CAS Registry Number: 627-11-2

Synonyms: (SANSS 1983 Synonyms) Formic acid, Chloro-, 2-Chloroethyl Ester; Carbonochloridic Acid, 2-Chloroethyl Ester; .beta.-Chloroethyl Chloroformate; (2-Chloroethoxy)carbonyl Chloride; Chloroformic Acid, 2-Chloroethyl Ester; TL 207; 2-Chloroethyl Chlorocarbonate; 2-Chloroethyl Chloroformate

Chemical Formula: $C_3H_4Cl_2O_2$

Molecular Weight: 142.97

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse) 0.2 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 312.3°F, 155.7°C (Weast 1978, p. C-310)

Specific Gravity (H_2O=1): 1.3847 (Weast 1978, p. C-310)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1978, p. C-310)

Appearance and Odor: Not Found

CHLOROETHYL CHLOROFORMATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Ethyl Chloroformate) Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 28).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

CHLOROETHYL CHLOROFORMATE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Ethyl Chloroformate) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	GOOD/LIMITED**
Nitrile	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Ethyl Chloroformate) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 28).

CHLOROETHYL CHLOROFORMATE

COMMENTS

Sources searched but no information found:

Hawley 1981
Hayes 1982
Merck 1983
Clayton and Clayton 1981-82
CHRIS 1978
Weiss 1980
NFPA 1978
DASE 1980
Encyc Occupat Health and Safety 1983
Hayes 1982
Buchel 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- OUABAIN

CAS Registry Number: 630-60-4

Synonyms: 3-((6-Deoxy-alpha-L-Mannopyranosyl)Oxy)-1,5,11alpha,14,19-Pentahydroxycard-20(22)-Enolide; Acocantherin; Astrobain; Card-20(22)-Enolide, 3-((6-Deoxy-alpha-L-Mannopyranosyl)Oxy)-1,5,11,14,19-Pentahydroxy-, (1beta,3beta,5beta,11alpha)-; G-Strophanthin; G-Strophicor; Gratibain; Gratus Strophanthin; Kombetin; Ouabagenin L-Rhamnoside; Ouabaine; Purostrophan; Rectobaina; Solufantina; Strodival; Strophalen; Strophanthin G; Strophanthin Thoms; Strophoperm; Strophosan

Chemical Formula: $C_{29}H_{44}O_{12}$

Molecular Weight: 584.64

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 8.28 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 392°F, 200°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g/ 75 mL (Merck 1983, p. 990).

OUABAIN

SECTION II (continued)

Appearance and Odor: Odorless, white crystals or crystalline powder as an octahydrate (*Osol 1980).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): It is classified as extremely toxic. Probable oral lethal dose in humans is less than 5 mg/kg or a taste (less than 7 drops) for 70 kg (150-lb.) person (*Gosselin 1976). Exposure may result in respiratory and cardiac failure, and/or hyperalkemia (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Patients with frequent premature ventricular heart beats or who have received any preparation of digitalis during preceding three weeks are prone to toxicity (*Gilman 1980).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Medicine, n.o.s.) For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 11).

Special Fire Fighting Procedures: (Non-Specific -- Medicine, n.o.s.) Cool containers that are exposed to flames with water from the side until well after fire is out. For massive fires use unmanned hose holder or monitor nozzles; if this is impossible, withdraw and let fire burn. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 11).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2097).

NFPA Flammability Rating: Not Found

OUABAIN

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Stable in air, but affected by light (ouabain octahydrate) (*Osol 1980)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Hydrolysis yields one mole ouabagenin and one mole rhamnose (Merck 1983, p. 990). When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2097).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Indicated to produce rapid digitalization in acute congestive heart failure. Also recommended in treatment of atrial or nodal paroxysmal tachycardia and atrial flutter (Physicians' Desk Reference 1980, p. 1069).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Medcines, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. If water pollution occurs, notify appropriate authorities. Shut off ignition sources; no flares, smoking or flames in hazard area. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material. Small spills: absorb 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 container from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 11).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

OUABAIN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms of heart failure occur, with marked increase in serum potassium. Signs may include confusion, vomiting, coma, convulsions, and respiratory failure (*Rumack 1975 to Present; Gilman 1985, p. 738).

Emergency and First Aid Procedures: (Non-Specific -- Medicine, n.o.s.) Move victim to fresh air, call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 11).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIPHENYLTIN CHLORIDE

CAS Registry Number: 639-58-7

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, page 627): Stannane, Chlorotriphenyl-; Brestanol; Chlorotriphenylstannane; Chlorotriphenyltin; Fentin Chloride; GC 8993; General Chemicals 8993; HOE 2872; LS 4442; TPTC; Tinmate; Triphenylchlorostannane; Triphenylchlorotin

Chemical Formula: $C_{18}H_{15}ClSn$

Molecular Weight: 385.47

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 18 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 464°F, 240°C at 13.5 mmHg (Sax 1984, p. 782)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 223°F, 106°C (Sax 1984, p. 782)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Sax 1984, p. 782) 40 ppm (Farm Chemicals Handbook 1984, p. C-234)

Appearance and Odor: White crystalline solid (Hawley 1977, p. 1057)

TRIPHENYLTIN CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Tin, organic compounds) TWA 0.1 mg/m^3, as tin, (NIOSH 1987, p. 224)

ACGIH TLV: (Tin, organic compounds) TWA 0.1 mg/m^3, as tin (skin) (ACGIH, 1986-87, p. 31)

IDLH: Not Found

Other Limits Recommended: (Non-Specific -- Tin Compounds, Organic) IDLH 200 mg/m^3 (NIOSH/OSHA 1978, p. 180). Occupational exposure to organotin compounds recommended standard -- Air: TWA 0.1 mg (Sn)/m^3 (NIOSH/RTECS 1983, Volume 3, p. 627).

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 2582)
Ingestion: Yes (Sax 1984, p. 782)

Health Hazards (Acute, Delayed, and Chronic): Toxic and irritating to the skin (Hawley 1977, p. 1057). Dermal exposure may lead to severe skin burns as well as renal failure and possible death (Clayton and Clayton 1981-82, p. 1965). (Non-Specific -- Tin Compounds, Organic) Target organs affected are central nervous system, eyes, liver, urinary tract, skin and the blood (NIOSH/OSHA 1978, p. 181).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Extinguish fires with dry chemical, carbon dioxide, water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated, it emits toxic fumes of chlorides (Sax 1984, p. 782).

NFPA Flammability Rating: Not Found

TRIPHENYLTIN CHLORIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, when stored in dark with dry air (Farm Chemicals Handbook 1984, p. C234)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Hydrolyzes to hydroxide in water (Farm Chemicals Handbook 1984, p. C234)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorides (Sax 1984, p. 782).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a rodent repellent, molluscicide, fungicide and insecticide (Clayton and Clayton 1981-82, p. 1952).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Organic Tin Compounds) Eye irritation and acute local skin burns, irritation of the respiratory tract on inhalation and irritation of the gastrointestinal tract following

TRIPHENYLTIN CHLORIDE

SECTION IX (continued)

ingestion (Encyc Occupat Safety and Health 1983, p. 2179). (Non-Specific -- Tin Compounds, Organic) Other symptoms include headache, dizziness, sore throat, cough, abdominal pain, vomiting, urine retention and skin burns (NIOSH/OSHA 1978, p. 181).

Emergency and First Aid Procedures: In case of a dermal exposure, wash with water or scrub with a strong detergent soap and water (Clayton and Clayton 1981-82, p. 1966). In case of ingestion, induce vomiting and treat symptomatically (Farm Chemicals Handbook 1984, p. 234).

COMMENTS

Sources searched but no information found:

Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Arena 1979
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985
Weast 1979

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FLUOROACETAMIDE

CAS Registry Number: 640-19-7

Synonyms: 2-Fluoroacetamide; 1081; Acetamide, 2-Fluoro-; AFL 1081; Compound 1081; FAA; Fluorakil 100; Fluoroacetic Acid Amide; Fussol; Megatox; Monofluoroacetamide; Navron; Rodex; Yanock

Chemical Formula: C_2H_4FNO

Molecular Weight: 77.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 5.75 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Sublimes on heating (Hayes 1982, p. 499)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 225-228°F, 107-109°C (Hayes 1982, p. 499)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble (*Merck 1976)

Appearance and Odor: Colorless crystalline powder (*Worthing 1979)

FLUOROACETAMIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (*Hayes 1982)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is super toxic; probable oral lethal dose in humans is less than 5 mg/kg, or a taste (less than 7 drops) for a 150-lb. person (*Gosselin 1976). Chemically inhibits oxygen metabolism by cells with critical damage occurring to the heart, brain, and lungs resulting in heart failure, respiratory arrest, convulsions, and death (Gilman 1980, p. 1644).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 1428)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits very toxic fumes of fluorine containing compounds and nitrogen oxides when heated to decomposition (Sax 1984, p. 1428).

FLUOROACETAMIDE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Rodenticide (*SRI); insecticide proposed mainly for use on fruits to combat scale insects, aphids, and mites (*Merck 1976). Use is largely restricted to licensed pest control operators (*Doull 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Sodium Fluoroacetate) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

	POOR/LIMITED**
Neoprene	POOR/LIMITED**
Nitrile	POOR/LIMITED**
PE	POOR/LIMITED**
Viton	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for FLUOROACETAMIDE

(640-19-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Fluoroacetamide is extremely toxic. There is no known antidote. Immediately transport victims to a health care facility.*

Substance Characteristics:

Pure Form - Colorless crystals.

Commercial Form - Powder.

Use - Pesticide.

Caution: *Highly toxic fumes of fluorine-containing compounds and nitrogen oxides will be emitted when fluoroacetamide is heated to decomposition. Avoid sources of extreme heat including fire.*

Other Names - Baran, FAA, fluoroacetic acid amide, Fussol, Megatox, monofluoroacetamide, Navron, Rodex, Yanock.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin.

Signs and Symptoms of Acute Fluoroacetamide Exposure:

Warning: *Effects usually appear within 30 minutes of exposure but may be delayed as long as 20 hours. Caution is advised. Vital signs should be monitored closely.*

Signs and symptoms may be extremely severe and range from nausea, vomiting, and diarrhea to convulsions, coma, and heart failure. Other symptoms include hyperactivity, respiratory depression or arrest, cyanosis (blue tint to the skin and mucous membranes), and ventricular fibrillation.

FLUOROACETAMIDE

Emergency Life-Support Procedures:

Acute exposure to fluoroacetamide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to fluoroacetamide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. RUSH to a health care facility.

4. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to fluoroacetamide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. RUSH to a health care facility.

7. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

FLUOROACETAMIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. RUSH to a health care facility.

3. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of fluoroacetamide is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of fluoroacetamide may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETILAN

CAS Registry Number: 644-64-4

Synonyms: 1-Dimethylcarbamoyl-5-Methyl-3-Pyrazolyl Dimethylcarbamate; 2-(N,N-Dimethylcarbamyl)-3-Methylpyrazolyl-5 N,N-Dimethylcarbamate; 2-Dimethylcarbamoyl-3-Methyl-5-Pyrazolyl Dimethylcarbamate; Carbamic Acid, Dimethyl-, 1-((Dimethylamino)Carbonyl)-5-Methyl-1H-Pyrazol-3-yl Ester; Carbamic Acid, Dimethyl-, Ester with 3-Hydroxy-N,N,5-Trimethylpyrazole-1- Carboxamide; Dimethyl 2-Carbamyl-3-Methylpyrazolyldimethylcarbamate; Dimethylcarbamic Acid 1-[(Dimethylamino)Carbonyl]-5-Methyl-1H-Pyrazol-3-yl Ester; Dimethylcarbamic Acid Ester with 3-Hydroxy-N,N,5-Trimethylpyrazole-1- Carboxamide; Dimetilane; ENT 25,922; Fly Bands; G 22870; G-22870; Geigy 22870; Geigy GS-13332; GS-13332; Pyrazole-1-Carboxamide, 3-Hydroxy-N,N,5-Trimethyl-, Dimethyl Carbamate (Ester); Snip; Snip Fly; Snip Fly Bands

Chemical Formula: $C_{10}H_{16}N_4O_3$

Molecular Weight: 240.27

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 25 mg/kg (*NIOSH/RTECS)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 392-410°F, 200-210°C at 13 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.0001 at 20°C (*Worthing 1979)

Melting Point: 154-160°F, 68-71°C (*Merck 1976); technical grade 131-149°F, 55-65°C (Merck 1983, p. 476)

DIMETILAN

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Merck 1976)

Appearance and Odor: Colorless solid. The technical product is a yellow to reddish-brown solid (Merck 1983, p. 476)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Very toxic; probable oral lethal dose for humans is 50-500 mg/kg or between 1 teaspoon and 1 oz. for a 70 kg (150 lb.) person (*Gosselin 1976). Dimetilan is highly toxic by ingestion and moderately toxic by contact with the skin (Sax 1984, p. 1145). Death is primarily due to respiratory arrest of central origin, paralysis of the respiratory muscles, intense bronchoconstriction, or all three. This compound is a cholinesterase inhibitor (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamates) Extinguish fire using agent suitable for types of surrounding fire, as the material itself burns with difficulty. Use water in flooding quantities as a fog. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 104).

Special Fire Fighting Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Move container from fire area. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

DIMETILAN

SECTION IV (continued)

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1145). (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Hydrolyzed by acids and alkalis (*Merck 1976).

Hazardous Decomposition or Byproducts: When heated to decomposition, hazardous fumes of nitrogen oxides may be emitted (Sax 1984, p. 1145).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Formerly an insecticide for insect control on livestock, especially housefly control. It is no longer produced commercially in the U.S. (*SRI; Farm Chemicals Handbook 1984, p. C80)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, keep out of low areas. Do not touch spilled material, or breathe the vapors, dusts, or fumes from burning materials. Do not handle broken packages without protective equipment. Wash away any material that may have contacted the body with soap and water (Student 1981, p. 104; DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating,

DIMETILAN

SECTION VIII (continued)

chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms are similar to carbaryl poisoning: nausea, vomiting, abdominal cramps, diarrhea, pinpoint pupils, excessive salivation, and sweating are common symptoms. Running nose and tightness in chest are common in inhalation exposures. Difficulty in breathing, raspy breathing, and loss of muscle coordination may also be seen. Exposure may also result in random jerky movements, incontinence, convulsions, and coma and death (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CYANURIC FLUORIDE

CAS Registry Number: 675-14-9

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 802) s-Triazine, 2,4,6-Trifluoro-; 2,4,6-Trifluoro-s-Triazine; 1,3,5-Triazine, 2,4,6-Trifluoro-

Chemical Formula: $C_3F_3N_3$

Molecular Weight: 135.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.017 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

CYANURIC FLUORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2649)
Skin: Yes (Sax 1984, p. 2649)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by skin contact and inhalation (Sax 1984, p. 2649).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of fluorides and nitrogen oxides (Sax 1984, p. 2649).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2649)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of fluoride and nitrogen oxides (Sax 1984, p. 2649).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

CYANURIC FLUORIDE

SECTION V (continued)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Weast 1979
Hawley 1981
Arena 1979
Merck 1983
Encyc Occupat Health and Safety 1983
Gosselin 1984
Weiss 1980
CHRIS 1978
Hayes 1982
Student 1981
DOT 1984
Buchel 1983
Farm Chemicals Handbook 1984
U.S. Army 1975

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL PHOSPHONIC DICHLORIDE

CAS Registry Number: 676-97-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 119): Phosphonic Dichloride, Methyl-

Chemical Formula: CH_3Cl_2OP

Molecular Weight: 132.91

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.141 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

METHYL PHOSPHONIC DICHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (DOT 1984, Guide 39)
Skin: Yes (DOT 1984, Guide 39)
Ingestion: Yes (DOT 1984, Guide 39)

Health Hazards (Acute, Delayed, and Chronic): Poisonous if inhaled or swallowed. Contact causes severe burns to skin and eyes (DOT 1984, Guide 39).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Do not get water inside container. Small fires: dry chemical or carbon dioxide. Large fires: flood fire area with water from a distance. Do not get solid stream of water on spilled material. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 39).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 39).

Unusual Fire and Explosion Hazards: This material may burn but does not ignite readily. May ignite other combustible materials (wood, paper, oil, etc.). Reacts violently with water. Flammable poisonous gases may accumulate in tanks and hopper cars. Runoff to sewer may create fire or explosion hazard. Contact causes severe burns to skin and eyes. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 39).

NFPA Flammability Rating: Not Found

METHYL PHOSPHONIC DICHLORIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Violent reaction with water (DOT 1984, Guide 39)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe vapors (see Section III above). Do not get water inside container; stop leak if you can do so without risk. Do not touch spilled material. Use water spray to reduce vapors but do not put water on leak or spill area. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Dike spill for later disposal; do not apply water unless directed to do so. Clean up only under supervision of an expert (DOT 1984, Guide 39).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. Speed in removing material from skin is of extreme importance. In case of contact with material, immediately flush

METHYL PHOSPHONIC DICHLORIDE

SECTION IX (continued)

skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 39).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENYL DICHLOROARSINE

CAS Registry Number: 696-28-6

Synonyms: Arsine, Dichlorophenyl-; Arsine, Dichloro(phenyl)-; Arsonous Dichloride, Phenyl-; Dichlorophenylarsine; Phenylarsinedichloride; TL 69

Chemical Formula: $C_6H_5AsCl_2$

Molecular Weight: 223

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (guinea pig) 4 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 489.9-495.7°F, 254.4-257.6°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.6516 at 19°C (*Weast 1979)

Vapor Pressure (mmHg): 0.033 at 25°C (U.S. Army 1975, p. 3-13)

Melting Point: -4°F, -20°C (*Hawley 1977)

Vapor Density (AIR=1): 7.7 (U.S. Army 1975, p. 3-13)

Evaporation Rate (Butyl acetate=1): 390 mg/m^3 at 25°C (U.S. Army 1975, p. 3-13))

Solubility in Water: Insoluble (*Weast 1979)

Appearance and Odor: Liquid -- microcrystalline (*Hawley 1977) odorless (U.S. Army 1975, p. 3-14)

PHENYL DICHLOROARSINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p.54)

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: (Arsenic and compounds) NIOSH: 0.002 mg/m^3, 15 minute ceiling (NIOSH 1987, p. 54). NIOSH occupational carcinogen (NIOSH 1987, p. 54)

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 800)
Skin: Yes (Hawley 1981, p. 800)
Ingestion: Yes (Hawley 1981, p. 800)

Health Hazards (Acute, Delayed, and Chronic): Median lethal dosage 2600 mg-minute/m^3. Mean incapacitating dosage 16 mg-minute/m^3 as a vomiting agent and 1800 mg-minute/m^3 as a blistering agent. 633 mg-minute/m^3 produces eye injury (U.S. Army 1975, p. 3-14). Poisonous; may be fatal if inhaled, swallowed, or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 55). Strong irritant to eyes, skin, and tissue (*Hawley 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): High enough not to interfere with normal use (U.S. Army 1975, p. 3-13)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, foam, or fog (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: This material may burn but does not ignite readily. Containers may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

PHENYL DICHLOROARSINE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (Decomposed by water) (Hawley 1981, p. 800)
Stable:

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Decomposed by water (Hawley 1981, p. 800)

Hazardous Decomposition or Byproducts: Upon decomposition hydrogen chloride and phenylarsenious oxide are emitted (U.S. Army 1975, p. 3-13).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used in organic synthesis, as a military tear gas, and a solvent (Hawley 1981, p. 800).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Vomiting and blistering may occur (U.S. Army 1975, p. 3-14).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If

PHENYL DICHLOROARSINE

SECTION IX (continued)

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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSMET

CAS Registry Number: 732-11-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, P. 145) Phosphorodithioic Acid, O,O-Dimethyl Ester, S-Ester with N-(Mercaptomethyl)phthalimide; Imidan; APPA; Decemthion; Decemthion P-6; (O,O-Dimethyl-Phthalimidiomethyldithiophosphate); O,O-Dimethyl S-(N-Phthalimidomethyl) Dithiophosphate; O,O-Dimethyl S-Phthalimidomethyl Phosphorodithioate; ENT 25,705; Ftalophos; N-(Mercaptomethyl)Phthalimide S-(O,O-Dimethyl Phosphorodithioate); Percolate; Phosphorodithioic Acid, S-((1,3-Dihydro-1,3-Dioxo-2H-Isoindol-2-yl)Methyl) O,O-Dimethyl Ester; Phosmet; Phthalimide, N-(Mercaptomethyl)-, S-Ester with O,O-Dimethyl Phosphorodithioate; Phthalimidomethyl O,O-Dimethyl Phosphorodithioate; Phthalophos; PMP; Prolate; R 1504; Smidan; Stauffer R 1504

Chemical Formula: $C_{11}H_{12}NO_4PS_2$

Molecular Weight: 317.32

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.054 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes below boiling point (*Spencer 1982)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.001 at 122°F, 50°C (*Merck 1983)

Melting Point: 161°F, 71.9°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

PHOSMET

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 25 mg/liter at 25°C (*Worthing 1979)

Appearance and Odor: Off-white crystalline solid (*Merck 1983), offensive odor (*Spencer 1982).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Maximum air concentration in the USSR is 0.3 mg/m^3 (Encyc Occupat Health and Safety 1983, p. 1643).

Routes of Entry: **Inhalation:** Yes (*NIOSH/RTECS 1985)
Skin: Yes (Encyc Occupat Health and Safety 1983, p. 1643)
Ingestion: Yes (*NIOSH/RTECS 1985)

Health Hazards (Acute, Delayed, and Chronic): It is an organophosphorus pesticide (Buchel 1983, p. 69). This material is very toxic; the probable oral lethal dose for humans is 50-500 mg/kg, or between 1 teaspoon and 1 oz. for a 150 lb. person. It is a cholinesterase inhibitor and has central nervous system effects (Gosselin 1984, p. II-298). Oral lethal doses in humans have been reported at 50 mg/kg (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.). Stay upwind; keep out of low areas. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

PHOSMET

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.). Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Clayton and Clayton 1981-82)

Conditions to Avoid: Storage above 113°F, 45°C, may lead to decomposition (*Spencer 1982).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is an insecticide and acaricide (*Worthing 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This is an organophosphorus pesticide (Buchel 1983, p. 69). As for other organophosphorus pesticides stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. Take up small, dry spills with clean shovel and place in clean, dry container. Dike far ahead of large spills for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PHOSMET

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHOSMET

(732-11-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless, crystalline solid.

Odor - Offensive.

Commercial Form - Pure off-white or pink solid (94 to 96%).

Use - Pesticide.

Caution: *Phosmet may produce toxic gases when heated; containers may explode in the heat of fire. Avoid sources of extreme heat.*

Other Names - APPA, Decemthion, Ftalophos, Imidan, Imidathion, Percolate, PMP, Prolate, Safidon, Simidan, Smidan, O,O-dimethyl S-phthalimidomethyl phosphorodithioate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Phosmet Exposure:

Note: Phosmet is a cholinesterase inhibitor.

Acute exposure to phosmet may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

PHOSMET

The heart rate may decrease following oral exposure or increase following dermal exposure. Chest pain may be noted. Hypotension (low blood pressure) may occur, although hypertension (high blood pressure) is not uncommon. Dyspnea (shortness of breath) may be followed by respiratory collapse. Giddiness is common.

Emergency Life-Support Procedures:

Acute exposure to phosmet may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phosmet.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phosmet.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

PHOSMET

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of phosmet is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of phosmet may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHACRYLIC ANHYDRIDE

CAS Registry Number: 760-93-0

Synonyms: (SANSS 1983 Synonyms) 2-Propenoic Acid, 2-Methyl-, Anhydride; Methacrylic Acid Anhydride; Methacryloyl Anhydride

Chemical Formula: $C_8H_{10}O_3$

Molecular Weight: 154.17

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.45mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 192°F, 89°C at 5 mmHg (Weast 1979, p. C-465)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (Weast 1979, p. C-465)

Appearance and Odor: Not Found

METHACRYLIC ANHYDRIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Methacrylic Acid) This material may react violently with water. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 60).

Special Fire Fighting Procedures: (Non-Specific -- Methacrylic Acid) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 60).

Unusual Fire and Explosion Hazards: (Non-Specific -- Methacrylic Acid) This material may burn but may not ignite readily. Flammable/ poisonous gases may accumulate in tanks and hopper cars. Some of these materials may ignite combustibles (wood, paper, oil, etc.) (DOT 1984, Guide 60).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

METHACRYLIC ANHYDRIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Methacrylic Acid) Do not touch spilled material; stop leak if you can do so without risk. For small spills, absorb with sand or other noncombustible absorbent material and place into containers for later disposal. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 60).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Methacrylic Acid) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 60).

COMMENTS

Sources searched but no information found:

NIOSH/RTECS 1983
ACGIH 1983
NIOSH/OSHA 1978

METHACRYLIC ANHYDRIDE

COMMENTS (Continued)

Hawley 1981
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CARBOPHENOTHION

CAS Registry Number: 786-19-6

Synonyms: Phosphorodithioic Acid, S-(((p-Chlorophenyl)Thio)Methyl) O,O-Diethyl Ester; Acarithion; Akarithion; Carbofenothion; Carbofenthion; Dagadip; Endyl; ENT 23,708; Ethyl Carbophenothion; Garrathion; Hexathion; Lethox; Nephocarp; O,O-Diethyl S-p-Chlorophenylthiomethyl Dithiophosphate; Phosphorodithioic Acid, S-(((4-Chlorophenyl)Thio)Methyl) O,O-Diethyl Ester; Phosphorodithioic Acid, S-(((p-Chlorophenyl)Thio)Methyl) O,O-Diethyl Ester; R-1303; S-(((p-Chlorophenyl)Thio)Methyl) O,O-Diethyl Phosphorodithioate; S-(4-Chlorophenylthiomethyl) Diethyl Phosphorothiolothionate; Stauffer R-1,303; Trithion; Trithion Miticide

Chemical Formula: $C_{11}H_{16}ClO_2PS_3$

Molecular Weight: 342.85

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 6.8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 180°F, 82°C at 0.01 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.271 at 77°F, 25°C (*Merck 1976)

Vapor Pressure (mmHg): 0.0000003 at 68°F, 20°C (*Martin and Worthing 1974)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

CARBOPHENOTHION

SECTION II (continued)

Solubility in Water: Practically insoluble (*Merck 1976); less than 4 mg/liter at 20°C (Hayes 1982, p. 394)

Appearance and Odor: Off-white to amber liquid, mild sulfur (rotten eggs) like odor (*Martin and Worthing 1974).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Hayes 1982, p. 394)
Ingestion: Yes (Hayes 1982, p. 394)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic; the estimated fatal oral dose is 0.6 g for a 150 lb. (70 kg) person (*Arena 1974). It is an indirect cholinesterase inhibitor, meaning its effects are on the nervous system (Hayes 1982, p. 394).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s) Stay upwind; keep out of low areas. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

CARBOPHENOTHION

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide Liquid, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Martin 1974)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is an insecticide and acaricide, primarily for citrus crops and deciduous fruits and nuts (*SRI; *Farm Chemicals Handbook 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CARBOPHENOTHION

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, weakness, muscle twitching, difficult breathing, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIETHYL CHLOROPHOSPHATE

CAS Registry Number: 814-49-3

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 137) Phosphorochloridic Acid, Diethyl Ester; Chlorophosphoric Acid, Diethyl Ester; Diethoxyphosphorous Oxychloride

Chemical Formula: $C_4H_{10}ClO_3P$

Molecular Weight: 172.56

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (rabbit) 7.9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 140°F, 60°C at 2 mmHg (Sax 1984, p. 1007)

Specific Gravity (H_2O=1): 1.1915 at 25°C/25°C (Sax 1984, p. 1007)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): 5.94 (Sax 1984, p. 1007)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Clear liquid (Sax 1984, p. 1007)

DIETHYL CHLOROPHOSPHATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 345)
Skin: Yes (Hawley 1981, p. 345)
Ingestion: Yes (Hawley 1981, p. 345)

Health Hazards (Acute, Delayed, and Chronic): This material is a cholinesterase inhibitor. It has high oral and very high dermal toxicity. It is a skin irritant (Sax 1984, p. 1007). It is also toxic by inhalation (Hawley 1981, p. 345).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material is combustible (Hawley 1981, p. 345). Methods for combustible liquids are as follows. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 27).

Special Fire Fighting Procedures: Use the following procedures for combustible liquids. Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. 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. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 27).

Unusual Fire and Explosion Hazards: Emits very toxic fumes of chloride and phosphorus oxides when heated to decomposition (Sax 1984, p. 1007).

NFPA Flammability Rating: Not Found

DIETHYL CHLOROPHOSPHATE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits very toxic fumes of chloride and phosphorus oxides when heated to decomposition (Sax 1984, p. 1007).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an intermediate in organic synthesis (Hawley 1981, p. 345).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material. Do not breathe vapors (see Section III above). This material is a combustible liquid (Hawley 1981, p. 345). For a spill or leak of a combustible liquid, shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 27).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

DIETHYL CHLOROPHOSPHATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIETHYL CHLOROPHOSPHATE

(814-49-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Water-white liquid.

Use - Chemical intermediate.

Caution: *Avoid sources of extreme heat including fire. Diethyl chlorophosphate will liberate toxic phosphorus oxide fumes and hydrogen chloride gas when heated to decomposition.*

Other Names - Chlorophosphoric acid, diethyl ester; diethoxyphosphorous oxychloride; diethyl phosphorochloridate; phosphorochloridic acid, diethyl ester.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Diethyl Chlorophosphate Exposure:

Note: Diethyl chlorophosphate is a cholinesterase inhibitor.

Acute exposure to diethyl chlorophosphate may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

DIETHYL CHLOROPHOSPHATE

The heart rate may either decrease following oral exposure or increase following dermal exposure. Chest pain may be noted. Hypotension (low blood pressure) may be observed, although hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Diethyl chlorophosphate may severely irritate or burn the skin, eyes, or mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to diethyl chlorophosphate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to diethyl chlorophosphate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to diethyl chlorophosphate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

DIETHYL CHLOROPHOSPHATE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ACRYLYL CHLORIDE

CAS Registry Number: 814-68-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 276) Acrylic Acid Chloride; Acryloyl Chloride; Propenoyl Chloride; 2-Propenoyl Chloride

Chemical Formula: C_3H_3ClO

Molecular Weight: 90.51

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.092 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 167°F, 75°C (Hawley 1981, p. 17)

Specific Gravity (H_2O=1): 1.1136 at 20°C/4°C (Weast 1979, p. C-465)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Liquid (Hawley 1981, p. 17)

ACRYLYL CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 134)
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Decomposes in water (Weast 1979, p. C-465).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorides (Sax 1984, p. 134).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

ACRYLYL CHLORIDE

SECTION VI -- USE INFORMATION

Monomer; intermediate (Hawley 1981, p. 17).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Merck 1983
Weiss 1980
NIOSH/OSHA 1978
ACGIH 1983
Gosselin 1984
Encyc Occupat Health and Safety 1983
DOT 1984
NFPA 1984
Student 1981
Verschueren 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ANILINE, 2,4,6-TRIMETHYL-

CAS Registry Number: 88-05-1

Synonyms: 2,4,6-Trimethylaniline; 2-Aminomesitylene; Aminomesitylene; Benzenamine, 2,4,6-Trimethyl-; Mesidin; Mesidine; Mesitylamine; Mesitylene, 2-Amino-

Chemical Formula: $C_9H_{13}N$

Molecular Weight: 135.2

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.29 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 450-451°F, 232-233°C (Weast 1980, p. C-148)

Specific Gravity (H_2O=1): 0.9633 (Weast 1980, p. C-148)

Vapor Pressure (mmHg): Not Found

Melting Point: 23°F, -5°C (Weast 1980, p. C-148)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

ANILINE, 2,4,6-TRIMETHYL-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2661)

Health Hazards (Acute, Delayed, and Chronic): This material is moderately toxic orally. It is also considered highly toxic by unspecified routes. It is a skin and eye irritant (Sax 1984, p. 2661). Suspect occupational carcinogen (Clayton and Clayton 1981-82, p. 2892). (Non-Specific -- Aromatic Amines) The danger of acute poisoning is represented by methemoglobinemia leading to adverse effects on the red cells. A number of the amines may act as skin sensitizers (Encyc Occupat Health and Safety 1983, p. 142).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. If water pollution occurs, notify appropriate authorities (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 2661).

NFPA Flammability Rating: Not Found

ANILINE, 2,4,6-TRIMETHYL-

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2661)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 2661).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Repeated exposure results in narrowing of peripheral vision, increase in size of blind spot and decrease in photosensitivity (*Grant 1974).

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Move victim to fresh air; 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

ANILINE, 2,4,6-TRIMETHYL-

SECTION IX (continued)

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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DINOSEB

CAS Registry Number: 88-85-7

Synonyms: 2,4-Dinitro-6-(1-Methylpropyl)Phenol; 2,4-Dinitro-6-sec-Butylphenol; 2-(1-Methylpropyl)-4,6-Dinitrophenol; Phenol, 2-sec-Butyl-4,6-Dinitro-; 4,6-Dinitro-2-(1-Methyl-n-Propyl)Phenol; 4,6-Dinitro-2-sec-Butylphenol; 4,6-Dinitro-o-sec-Butylphenol; AATOX; Aretit; Basanite; BNP 20; BNP 30; Butaphene; Caldon; Chemox General; Chemox PE; DBNF; Dibutox; Dinitrall; Dinitro Weed Killer; Dinitro-Ortho-Sec-Butyl Phenol; Dinitrobutylphenol; Phenol, 2-(1-Methylpropyl)-4,6-Dinitro-; DN 289; DNBP; DNOSBP; DNSBP; Dow General; Dow General Weed Killer; Dow Selective Weed Killer; Dytop; Elgetol; Elgetol 318; ENT 1,122; Gebutox; Hivertox; Kiloseb; Knoxweed; Ladob; Laseb; Nitropone; Phenol, 2-(1-Methylpropyl)-4,6-Dinitro-; Phenol, 2-sec-Butyl-4,6-Dinitro-; Premerg; Sinox General; Subitex

Chemical Formula: $C_{10}H_{12}N_2O_5$

Molecular Weight: 240.2

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.2647 at 45°C (*Weed Science Society of America 1979)

Vapor Pressure (mmHg): 1 at 151.1°C (*Weed Science Society of America 1979)

Melting Point: 100-108°F, 38-42°C (Merck 1983, p. 479)

DINOSEB

SECTION II (continued)

Vapor Density (AIR=1): 7.73 (Sax 1984, p. 582)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.0052 g/100 ml (*Weed Science Society of America 1979)

Appearance and Odor: Orange-brown viscous liquid (Merck 1983, p. 479); pungent odor (*Weed Science Society of America 1979) or crystals (*Sax 1979); orange solid when pure; technical grade is orange-brown solid (Worthing 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Weed Science Society of America 1979)
Skin: Yes (Hawley 1981, p. 374)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic: Probable oral lethal dose is 5-50 mg/kg; between 7 drops and 1 teaspoonful for 70 kg person (150 lb.) (Gosselin 1976, p. II-197).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 60.1°F to 84.9°F, 15.6°C to 29.4°C for 3 commercial products (*Weed Science Society of America 1979)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material is a dinitrophenol herbicide (Buchel 1983, p. 304). (Non-Specific -- Dinitrophenol, Flammable Solid) Extinguish by flooding with water. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible (Student 1981, p. 205).

Special Fire Fighting Procedures: This is a dinitrophenol herbicide (Buchel 1983, p. 304). (Non-Specific -- Dinitrophenol, Flammable Solid) Wear self-contained breathing apparatus and full protective clothing. If

DINOSEB

SECTION IV (continued)

fire becomes uncontrollable, evacuate for a radius of 5000 feet (Student 1981, p. 206).

Unusual Fire and Explosion Hazards: This is a dinitrophenol herbicide (Buchel 1983, p. 304). (Non-Specific -- Dinitrophenol, Flammable Solid). It is dangerously explosive. When not water wet it is a high explosive. Dry, the material is easily ignited and it will burn very vigorously (Student 1981, p. 205).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Kearney 1975)

Conditions to Avoid: Appear to be stable in acid solution, but are susceptible to decomposition by ultraviolet radiation in alkaline solution (*Kearney 1975).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: On decomposition, nitro compounds such as this emit toxic fumes (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Plant growth regulator; insecticide and herbicide (Hawley 1981, p. 374).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This is a dinitrophenol herbicide (Buchel 1983, p. 340). (Non-Specific -- Dinitrophenol, Flammable Solid) Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water. Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Keep spilled material wet. Do not attempt to sweep up dry material (Student 1981, p. 206).

DINOSEB

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DINOSEB

(88-85-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Dark orange viscous liquid or dark brown crystals.

Odor - Pungent.

Commercial Forms - Orange-brown emulsifiable concentrate or oil solution.

Uses - Plant growth regulator, pesticide.

Material to Avoid - Alkali.

Other Names - AATOX, Aretit, Basanite, Butaphene, Caldon, Chemox General, Dibutox, Dinitrall, dinitrobutylphenol, Dow General, Dytop, Elgetol, Hivertox, Kiloseb, Knoxweed, Nitropone, Premerg, Sinox General, Subitex.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Dinoseb Exposure:

Warning: *Effects may be delayed from several hours to 2 days. Caution is advised. Toxicity of dinoseb is enhanced by high ambient temperature and physical activity.*

Early manifestations of dinoseb exposure include fever, sweating, headache, and confusion. Elevations of blood pressure, pulse, and respiratory rate are common. Severe exposure may result in restlessness, seizures, and coma.

Other signs and symptoms include dyspnea (shortness of breath), pulmonary edema, nausea, vomiting, and abdominal pain. Liver injury with associated jaundice, kidney failure, and cardiac arrhythmias may be noted. Muscle weakness may be pronounced. Dermal exposure results in yellow staining of the skin and may produce burns.

DINOSEB

Emergency Life-Support Procedures:

Acute exposure to dinoseb may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to dinoseb.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to dinoseb.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Vigorously wash exposed skin areas with soap and water. Yellowish coloration usually accompanies dermal exposure; the discoloration does not have to be fully removed to prevent further absorption.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

DINOSEB

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of dinoseb is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of dinoseb may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate, and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TOLUENE 2,6-DIISOCYANATE

CAS Registry Number: 91-08-7

Synonyms: 2,6-Toluene Diisocyanate; 1,3-Diisocyanato-2-Methylbenzene; 2,6-Diisocyanato-1-Methylbenzene; 2,6-Diisocyanatotoluene; 2,6-TDI; 2-Methyl-m-Phenylene Isocyanate; 2-Methyl-meta-Phenylene Isocyanate; Benzene, 2,6-Diisocyanato-1-Methyl-; Hylene TCPA; Hylene TIC; Hylene TM; Hylene TM-65; Hylene TRF; Isocyanic Acid, 2-Methyl-m-Phenylene Ester; Isocyanic Acid, 2-Methyl-meta-Phenylene Ester; m-Tolylene Diisocyanate; meta-Tolylene Diisocyanate; NIAX TDI; NIAX TDI-P; Tolylene 2,6-Diisocyanate

Chemical Formula: $C_9H_6N_2O_2$

Molecular Weight: 174.2

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.091 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 264-271°F, 129-133°C at 18 mmHg (*IARC 1972-1985)

Specific Gravity (H_2O=1): 1.22 at 25°C for a 80% 2,4:20% 2,6 TDI mixture (*ACGIH 1980)

Vapor Pressure (mmHg): 0.5 at 25°C for a 80% 2,4:20% 2,6 TDI mixture (*ACGIH 1980)

Melting Point: 68-72°F, 20-22°C for a 80% 2,4:20% 2,6 TDI mixture (*ACGIH 1980)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

TOLUENE 2,6-DIISOCYANATE

SECTION II (continued)

Solubility in Water: Not Found

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 1030)
Skin: Yes (Hawley 1981, p. 1030)
Ingestion: Yes (Hawley 1981, p. 1030)

Health Hazards (Acute, Delayed, and Chronic): Classified as slightly toxic orally. Probable oral lethal dose in humans is 5 to 15 g/kg or between 1 pint and 1 quart for a 70 (150 lb.) person (*Gosselin 1976). Particularly poisonous when breathed. This is among the most poisonous of isocyanates (*Lefaux 1968). Acute and chronic exposures to low concentrations may produce asthmatic attacks (Doull 1980, p. 533).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 270°F, 132°C for a 80% 2,4:20% 2,6 TDI mixture (*ACGIH 1980)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Should be extinguished with carbon dioxide, dry chemical or inert gas. For large fires fight with water in the form of spray (*Encyc Occupat Health and Safety 1981).

Special Fire Fighting Procedures: Should wear a self-contained breathing apparatus (*Encyc Occupat Health and Safety 1971). Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 57).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1084). Ventilation should be adequate. If polyurethane products are heated, protection against isocyanate release is necessary (*Encyc Occupat Health and Safety 1971).

TOLUENE 2,6-DIISOCYANATE

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 1084)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1084).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Manufacturing of polyurethane foams, elastomers, and coatings; crosslinking agent for nylon 6 (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Decontaminate with a suitable solution such as 10 percent ammonia with alcohol (*Encyc Occupat Health and Safety 1971). Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering them. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material, stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible 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 spill for later disposal (DOT 1984, Guide 57).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

TOLUENE 2,6-DIISOCYANATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TOLUENE 2,6-DIISOCYANATE

(91-08-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Water-white to pale yellow liquid.

Odor - Sharp, pungent.

Commercial Forms - Liquid in drums or tank cars.

Uses - Cross-linking agent for nylon; manufacture of polyurethane foams, elastomers, and coatings.

Materials to Avoid - Water (except for use in emergency life support).

Caution: *Mixing with water may result in a violent reaction. Sources of extreme heat or ignition (including sparks or fire) may result in the formation of toxic nitrogen oxide gases.*

Other Names - Hylene TCPA, m-Tolylene diisocyanate, Niax TDI.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Toluene 2,6-Diisocyanate Exposure:

Warning: *Toluene 2,6-diisocyanate is a powerful irritant to the lungs, skin, eyes, and gastrointestinal tract. Caution is advised.*

Signs and symptoms of acute exposure to toluene 2,6-diisocyanate may be severe and include burning of the skin, eyes, nose, and throat. Cough, laryngitis, chest pain, tightness in the chest, bronchitis, asthma, emphysema, and enlargement of the right side of the heart may also occur. Gastrointestinal effects may include vomiting and abdominal pain. Headache, insomnia, euphoria, depression, anxiety, paranoia, neuroses, and ataxia (incoordination) may also be noted.

TOLUENE 2,6-DIISOCYANATE

Emergency Life-Support Procedures:

Acute exposure to toluene 2,6-diisocyanate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to toluene 2,6-diisocyanate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to toluene 2,6-diisocyanate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

TOLUENE 2,6-DIISOCYANATE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CRESOL, -o

CAS Registry Number: 95-48-7

Synonyms: o-Cresol; 1-Hydroxy-2-Methylbenzene; 2-Cresol; 2-Hydroxytoluene; 2-Methylphenol; o-Cresylic Acid; o-Hydroxytoluene; o-Methylphenol; o-Methylphenylol; o-Oxytoluene; o-Toluol; Orthocresol; Phenol, 2-Methyl-

Chemical Formula: C_7H_8O

Molecular Weight: 108.15

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.179 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 376°F, 191°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.047 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 1 at 38.2°C (*Sax 1979)

Melting Point: 88°F, 31°C (*Weast 1979)

Vapor Density (AIR=1): 3.72 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 40 parts water (*Merck 1983)

Appearance and Odor: Colorless liquid (NFPA 1978, p. 49-32), colorless crystalline compound (*Clayton and Clayton 1981-82) or white crystals (*Hawley 1981) with phenolic odor (*Merck 1983)

CRESOL, -o

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 ppm (22 mg/m^3) (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 5 ppm (22 mg/m^3) (skin) (*ACGIH 1983)

IDLH: 250 ppm (NIOSH/OSHA 1978, p. 72)

Other Limits Recommended: NIOSH: 2.3 ppm (10mg/m^3) 10-hour TWA (NIOSH 1987, p. 86)

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (*Merck 1983)

Health Hazards (Acute, Delayed, and Chronic): The chemical is rated as a very toxic compound with a probable oral lethal dose in humans of 50-500 mg/kg, or between 1 teaspoon and 1 ounce for a 70 kg (150 lb.) person (*Gosselin 1976). It is a strong dermal irritant and frequently causes dermatitis. Serious or fatal poisoning may result if large areas of skin are wet with cresol, o- and the substance is not removed immediately (*ACGIH 1980). Ingestion of even a small amount may cause paralysis and coma (*Merck 1983). It is corrosive to body tissues (NFPA 1978, 49-32) with toxicity similar to phenol (Encyc Occupat Health and Safety 1983, p. 569).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 81-83°C (*Merck 1983)
Flammable Limits:
LEL: 1.4% at 300°F (*Sax 1979)
UEL: Not Found

Extinguishing Methods: Water to blanket the fire and dry chemical, foam, or carbon dioxide to extinguish the flames (*NFPA 1978). Extinguish small fires with dry chemical, carbon dioxide, water spray, or foam. For large fires use water spray, fog, or foam. Move container from fire area if you can do so without risk (*DOT 1984).

Special Fire Fighting Procedures: Use water to keep fire-exposed containers cool (*NFPA 1978). Fight fire from a maximum distance. Dike fire control water for later disposal; don't scatter the material. Wear positive pressure breathing apparatus and full protective clothing. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site (*DOT 1984).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. This material may burn but does not ignite readily. Container may explode in heat of fire (*DOT 1984). Slight explosion and fire hazard in the form of vapor when exposed to heat or flame (Sax 1984, p. 814).

CRESOL, -o

SECTION IV (continued)

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Reacts violently with nitric acid, oleum, and chlorosulfonic acid (Sax 1984, p. 814).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes (*Sax 1979).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 279)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate for phenolic and epoxy resins, sulfur chromium dyes, herbicides, magnet wire coatings, and pharmaceuticals; disinfectant; solvent; fiber treatment agent; tanning agent; and metal degreasing agent (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). Keep unnecessary people away; isolate the hazard area and deny entry. Do not touch spilled material. Stop leak if you can do so without risk. Use water spray to reduce vapors. For small spills, absorb the material with sand or other noncombustible absorbent material and place into containers for later disposal. For small dry spills, shovel up and place into clean, dry containers and cover. For large spills, dike far ahead of spill for later disposal. If clothing becomes contaminated remove immediately and isolate at the site (*DOT 1984). If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for personnel attempting to stop a leak. Water spray may be used to flush spills away from exposures (NFPA 1978, p. 49-32).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

CRESOL, -o

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Butyl/Neoprene	POOR/LIMITED*
CPE	GOOD/LIMITED*
PE	POOR/LIMITED
PVC	POOR/LIMITED*
Saranex	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for o-CRESOL

(95-48-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless liquid or white crystals below 31 degrees C (88 degrees F).

Odor - Phenollike.

Commercial Forms - Shipped in glass bottles, 10- and 55-gallon metal drums, 55-gallon metal barrels, tank trucks, tank cars, and tank barges.

Uses - Manufacture of resins, coatings, dyes, herbicides, pharmaceuticals; fiber treatment, tanning, metal degreasing; disinfectant; solvent.

Other Names - Cresylic acid, 2-methylphenol, o-hydroxytoluene, orthocresol, o-oxytoluene.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, polyethylene glycol 300 or 400, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, castor oil, diazepam, phenytoin, phenobarbital, 1% methylene blue.

Signs and Symptoms of Acute o-Cresol Exposure:

Warning: *Effects may be delayed. Caution is advised. Vital signs should be monitored closely.*

Signs and symptoms of acute exposure to o-cresol may include a weak pulse, hypotension (low blood pressure), tachycardia (rapid heart rate), cardiac arrhythmias, and cardiac failure. Tachypnea (rapid respiratory rate), pulmonary edema, and respiratory arrest or failure may be noted.

o-CRESOL

Weakness, headache, dizziness, tinnitus (ringing in the ears), shock, and delirium are common. Seizures may occur and are often followed by coma. Pallor, sweating, dilated pupils, and a profound drop in body temperature may also be found. Gastrointestinal effects include nausea, abdominal pain, bloody vomitus, and bloody diarrhea. Renal insufficiency may lead to hematuria (bloody urine).

o-Cresol is corrosive to the skin, eyes, and mucous membranes. Contact may result in severe and painful burns, which promptly become anesthetized (numb) to touch and pain. Ulceration may occur.

Emergency Life-Support Procedures:

Acute exposure to o-cresol may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to o-cresol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to o-cresol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

o-CRESOL

5. Wash exposed skin areas with undiluted polyethylene glycol 300 or 400. If polyethylene glycol is unavailable, use water. Follow initial polyethylene glycol or water wash with a second (water) wash.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Immediately give conscious and alert victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Do not exceed 250 mL (8 oz or 1 cup).

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENOL, 2,2'-THIOBIS(4,6-DICHLORO-

CAS Registry Number: 97-18-7

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 77): Actamer; Bidiphen; bis(2-Hydroxy-3,5-Dichlorophenyl) Sulfide; Bithionol; Bithionol Sulfide; Bitin; CP 3438; 2,2'-Dihydroxy-3,3',5,5'-Tetrachlorodiphenylsulfide; 2-Hydroxy-3,5-Dichlorophenyl Sulphide; Lorothidol; Lorothiodol; NCI-C60628; Neopellis; TBP; USAF B-22; XL 7; 2,2'-Thiobis(4,6-Dichlorophenol); Vancide BL

Chemical Formula: $C_{12}H_6Cl_4O_2S$

Molecular Weight: 356.04

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.73 at 25°C/4°C (Merck 1983, p. 182)

Vapor Pressure (mmHg): 0.0000000011 at 37°C (Merck 1983, p. 182)

Melting Point: 370°F, 188°C (Merck 1983, p. 182)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (Merck 1983, p. 182)

PHENOL, 2,2'-THIOBIS(4,6-DICHLORO-

SECTION II (continued)

Appearance and Odor: White or grayish-white powder with an odorless to phenolic odor (Hawley 1981, p. 137).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Non-Specific -- Phenol) (Gosselin 1976, p. III-272)
Ingestion: Yes (Sax 1984, p. 2567)

Health Hazards (Acute, Delayed, and Chronic): It is classified as slightly toxic. Probable oral lethal dose for humans is 5-15 g/kg for a 70 kg (150 lb) person. The toxicity of this compound is similar to that of phenol (Gosselin 1984, p. II-193). Major hazard of phenol poisoning stems from its systemic effects which include central nervous system depression with coma, hypothermia, loss of vasoconstricter tone, cardiac depression and respiratory arrest (Gosselin 1984, p. III-345).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2567)

PHENOL, 2,2'-THIOBIS(4,6-DICHLORO-

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits very toxic fumes of chlorine-containing compounds and sulfur oxides when heated to decomposition (Sax 1984, p. 2567).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a surfactant-formulated antimicrobial against bacteria, molds and yeast. It is proposed as an agricultural fungicide (Merck 1983, p. 182). Other uses include deodorant, germicide, fungistat and in the manufacture of pharmaceuticals (Hawley 1981, p. 137). It is no longer allowed to be used in cosmetics (Merck 1983, p. 182). A food additive in feed and drinking water of animals. Also a food additive permitted in food for human consumption (Sax 1984, p. 2567).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Phenol, Solid) Keep unnecessary people away and stay upwind. Do not touch spilled material. Use water spray to reduce vapors. Absorb spills with non-combustible absorbent material. For large spills dike far ahead for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Phenol) Symptoms include burning pain in mouth and throat; white necrotic lesions in mouth, esophagus and stomach; abdominal pain; vomiting; bloody diarrhea; paleness; sweating; weakness; headache; dizziness; tinnitus; scanty, dark-colored urine; weak irregular pulse and shallow respiration (Gosselin 1984, p. III-346).

Emergency and First Aid Procedures: (Non-Specific -- Phenol, Solid) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case

PHENOL, 2,2'-THIOBIS(4,6-DICHLORO-

SECTION IX (continued)

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 (DOT 1984, Guide 55).

COMMENTS:

Sources searched but no information found:
Hayes 1982
Farm Chemicals Handbook 1984
NFPA 1984
CHRIS 1978
Weiss 1980
Encyc of Occupat Health and Safety 1983
Student 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZENEARSONIC ACID

CAS Registry Number: 98-05-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 542) Phenyl arsenic acid; Phenylarsonic acid

Chemical Formula: $C_6H_7AsO_3$

Molecular Weight: 202.05

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 0.27 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.760 (Sax 1984, p. 362)

Vapor Pressure (mmHg): Not Found

Melting Point: 320°F, 160°C, decomposes (Sax 1984, p. 362; Merck, 1983, p.1067)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 40 parts water (Merck 1983, p. 151) (Sax 1984, p. 362)

Appearance and Odor: Colorless solid (Sax 1984, p. 362).

BENZENEARSONIC ACID

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.01 mg/m^3, as Arsenic (NIOSH 1987, p.54)

ACGIH TLV: (Soluble arsenic compounds) TWA 0.2 mg/m^3, as Arsenic (ACGIH 1984, p. 10)

IDLH: Not Found

Other Limits Recommended: NIOSH: (Arsenic and compounds) 0.02 mg/m^3, as Arsenic, 15 minute ceiling (NIOSH 1987, p.54)

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Hawley 1981, p. 799)

Health Hazards (Acute, Delayed, and Chronic): Benzenearsonic acid is a deadly poison (Sax 1984, p. 342). (Non-Specific -- Arsenic Compounds) Chronic exposure to arsenic compounds can cause dermatitis and digestive disorders (Clayton and Clayton 1981-82, p. 1522). Renal damage may develop (Gosselin 1981, p. III-43).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Arsenical Compound, Solid, n.o.s.) This material does not burn or burns with difficulty. Extinguish fire using agent suitable for surrounding fire (Student 1981, p. 51).

Special Fire Fighting Procedures: (Non-Specific -- Arsenical Compound, Solid, n.o.s.) Use water in flooding quantities as fog. Avoid breathing dusts and fumes; keep upwind; wear self-contained breathing apparatus (Student 1981, p. 51).

Unusual Fire and Explosion Hazards: Benzenearsonic acid emits poisonous fumes of arsenic when heated to decomposition (Sax 1984, p. 362).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

BENZENEARSONIC ACID

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition (320°F), it emits toxic arsenic fumes (Sax 1984, p. 362).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an analytical reagent for tin (Merck 1983, p. 151).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Arsenic Compound, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Arsenic) Symptoms of arsenic poisoning usually appear one-half to one hour after ingestion, but may be delayed many hours. Symptoms include a sweetish metallic taste and garlicky odor; difficulty in swallowing; abdominal pain; vomiting and painful diarrhea; dehydration, thirst, and cramps; dizziness, stupor, and delirium, rapid heart beat, headache, skin disorders, and coma (Gosselin 1981, p. III-45).

Emergency and First Aid Procedures: (Non-Specific -- Arsenic Compound, Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

BENZENEARSONIC ACID

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Weast 1979
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Arena 1979

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZOTRICHLORIDE

CAS Registry Number: 98-07-7

Synonyms: Toluene, alpha,alpha,alpha-Trichloro-; (Trichloromethyl)Benzene; 1-(Trichloromethyl) Benzene; alpha,alpha,alpha-Trichlorotoluene; Benzene, (Trichloromethyl)-; Benzenyl Chloride; Benzenyl Trichloride; Benzoic Trichloride; Benzyl Trichloride; Benzylidyne Chloride; omega,omega,omega-Trichlorotoluene; Phenylchloroform; Phenyltrichloromethane; Toluene Trichloride; Trichloromethylbenzene; Trichlorophenylmethane

Chemical Formula: $C_7H_5Cl_3$

Molecular Weight: 195.48

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.064 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 429.4°F, 220.8°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.3756 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 1 at 45.8°C; 10 at 87.6°C (*Weast 1979)

Melting Point: 23°F, -5.0°C (*Merck 1983)

Vapor Density (AIR=1): 6.77 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Merck 1983)

BENZOTRICHLORIDE

SECTION II (continued)

Appearance and Odor: Material is a clear, colorless to yellowish, oily liquid with a penetrating odor (*IARC 1972-1985; *Sax 1979; *Hawley 1981)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Not Found
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Toxic by inhalation; fumes are highly irritating to skin and mucous membranes (*Merck 1983, Hawley 1981, p. 119). May cause death or permanent injury after very short exposure to small quantities (*Sax 1975). A suspected carcinogen (*Sorahan 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 260°F, 127°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Cool containers that are exposed to flames with water from the side until well after the fire is out (DOT 1984, Guide 60).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and full protective clothing (DOT 1984, Guide 60). Normal fire fighting procedures may be used (*NFPA 1978).

Unusual Fire and Explosion Hazards: This material may react violently with water. Fire may produce irritating or poisonous gases. Flammable/poisonous gases may accumulate in tanks and hopper cars. Materials may ignite combustibles (wood, paper, oil, etc.) (*DOT 1984).

NFPA Flammability Rating: 1

BENZOTRICHLORIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Merck 1983)
Stable:
Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Similar to hydrochloric acid; material will react with water or steam to produce toxic and corrosive fumes (*Sax 1979). Hydrolyzes in presence of water forming benzoic and hydrochloric acids (Hawley 1981, p. 119; *Merck 1983).

Hazardous Decomposition or Byproducts: Produces toxic and corrosive fumes when it reacts with water or steam (*Sax 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Synthetic dyes; organic synthesis (Hawley 1981, p. 119).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Material is extremely hazardous to health but areas may be entered with extreme care. No skin surface should be exposed (*NFPA 1978). Spilled material should not be touched. Take up spills with noncombustible absorbent material. For large spills dike far ahead of spill for later disposal (DOT 1984, Guide 60). Water should be used in copious amounts because of reaction with water and formation of toxic by-products (see Section IV above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Highly irritating to skin and mucous membranes (*Merck 1983).

BENZOTRICHLORIDE

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with copious amounts of running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 60).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRICHLOROPHENYLSILANE

CAS Registry Number: 98-13-5

Synonyms: Silane, Trichlorophenyl-; Phenyltrichlorosilane; Phenyl Trichlorosilane; Phenylsilicon Trichloride; Phenyltrichlorosilicane; Silane, Phenyltrichloro-; Silicon Phenyl Trichloride

Chemical Formula: $C_6H_5Cl_3Si$

Molecular Weight: 211.55

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.0003 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 395°F, 201.5°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.326 at 18°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): 7.36 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water (*Weast 1979)

Appearance and Odor: Colorless liquid (*Weast 1979)

TRICHLOROPHENYLSILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2631)
Skin: Yes (Sax 1984, p. 2631)
Ingestion: Yes (Sax 1984, p. 2631)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic; may cause death or permanent injury after short inhalation exposure to small quantity (*Sax 1975). Chemical burns to all exposed membranes and tissues with severe tissue destruction. Inhalation -- lungs may fill up with fluid or throat may swell causing suffocation. Eyes -- damage to corneas may cause blindness. Delayed: after oral exposure stomach and intestines may perforate or be obstructed by scar tissue (*Rumack 1975 to Present, Gosselin 1984, pp. III-10-11).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 196°F (OC) (*Sax 1979)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Dry chemical, carbon dioxide, fog, or foam. May react violently with water (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Full protective clothing, including self-contained breathing apparatus, coat, pants, gloves, boots, and bands around legs, arms, and waist should be provided. No skin surface should be exposed (*NFPA 1978). Move container from fire area if you can do so without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: Do not get water inside containers. Vapors may travel to ignition source and flash back. Runoff to sewer may create fire or explosion hazard. Flammable/combustible material; may be ignited by heat, sparks or flames. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 29).

NFPA Flammability Rating: 2

TRICHLOROPHENYLSILANE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Hawley 1977)
Stable:

Conditions to Avoid: Readily hydrolyzed in water/moisture, producing hydrochloric acid (*Hawley 1977). Avoid mixing with water or exposing to moisture (*Sax 1979).

Incompatibility (Materials to Avoid): Do not mix with halogenated compounds, because a trace quantity of free halogen may cause violent explosion (*Bretherick 1979). May react violently with water (DOT 1984, Guide 29).

Hazardous Decomposition or Byproducts: Emits toxic chloride fumes when heated to decomposition (Sax 1984, p. 2631).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Monomer for copolymers in water repellants, in electrical insulating resins, in high temperature resins for paints (*SRI). Intermediate for silicones (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

No skin surface should be exposed (see Section III above). Isolate hazard area. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Do not get water inside container. Take up small spills with sand or other noncombustible absorbent material and place into containers for later disposal. Dike far ahead of large spills for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inhalation -- severe difficulty in breathing, chest pains. Eye contact -- severe pain, swelling, cornea

TRICHLOROPHENYLSILANE

SECTION IX (continued)

damage. Skin contact severe burns and pain. Ingestion -- mild to moderately severe oral and esophageal burns, with severe burns occurring in stomach. Perforations and peritonitis may occur. Severe irritation may produce spontaneous vomiting. Viscid white or blood-stained foamy mucus and threads of tissue may appear in mouth (*Rumack 1975 to Present).

Emergency and First Aid Procedures: Move victim to fresh air. If not breathing, perform artifical 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. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 29). In case of oral exposure, do not induce vomiting. Have patient drink 1-2 large glasses of water or milk to dilute stomach contents, then give demulcents such as milk, cornstarch, and water (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZENAMINE, 3-(TRIFLUOROMETHYL)-

CAS Registry Number: 98-16-8

Synonyms: m-(Trifluoromethyl)aniline; 1-Amino-3-(Trifluoromethyl)Benzene; 3-(Trifluoromethyl)Aniline; 3-(Trifluoromethyl)Benzenamine; 3-Aminobenzotrifluoride; alpha,alpha,alpha-Trifluoro-m-Toluidine; m-Amino-alpha,alpha,alpha-Trifluorotoluene; m-Aminobenzotrifluoride; m-Toluidine, alpha,alpha,alpha-Trifluoro-; Toluene, 3-Amino-alpha,alpha,alpha-Trifluoro-

Chemical Formula: $C_7H_6F_3N$

Molecular Weight: 161.13

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.44 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 369.5°F, 187.5°C at 764 mmHg (*Weast 1979)

Specific Gravity (H_2O=1): 1.303 at 15.5°C (Sax 1984, p. 192)

Vapor Pressure (mmHg): Not Found

Melting Point: 37°F, 3°C (Sax 1984, p. 192)

Vapor Density (AIR=1): 5.56 (Sax 1984, p. 192)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (*Weast 1979)

BENZENAMINE, 3-(TRIFLUOROMETHYL)-

SECTION II (continued)

Appearance and Odor: Colorless to yellow oily liquid (*Hawley 1977) with aniline-like odor (Sax 1984, p. 192).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 192)
Skin: Yes (DOT 1984, Guide 55)
Ingestion: Yes (Sax 1984, p. 192)

Health Hazards (Acute, Delayed, and Chronic): Contact may cause burns to skin and eyes. May be poisonous if inhaled, swallowed or absorbed through the skin (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: This material may burn but does not ignite readily. Cylinder may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

BENZENAMINE, 3-(TRIFLUOROMETHYL)-

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of fluorides and nitrogen oxides (Sax 1984, p. 192).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a chemical intermediate for herbicides, antihypertensives, and diuretics (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorities. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 55).

BENZENAMINE, 3-(TRIFLUOROMETHYL)-

COMMENTS:

Sources searched but no information found:

ACGIH 1984
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health & Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZAL CHLORIDE

CAS Registry Number: 98-87-3

Synonyms: (Dichloromethyl)Benzene; alpha,alpha-Dichlorotoluene; Benzene, (Dichloromethyl)-; Benzyl Dichloride; Benzylene Chloride; Benzylidene Chloride; Chlorobenzal; Dichlorophenylmethane; Toluene, alpha,alpha-Dichloro-

Chemical Formula: $C_7H_6Cl_2$

Molecular Weight: 161.03

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.4 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 5,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 401°F, 205°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.26 (*Merck 1983)

Vapor Pressure (mmHg): 1 at 35.4°C (Weast 1979, p. D-209)

Melting Point: 2.48°F, -16.4°C (Weast 1979, p. C-523)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble in water (*Merck 1983)

Appearance and Odor: Colorless oily liquid with a faint aromatic odor (*Hawley 1981) or pungent odor (*Merck 1983)

BENZAL CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): Acute: vapors are highly irritating to eyes (*Grant 1974). May be fatal if inhaled, swallowed, or absorbed through skin (*DOT 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: This material may burn but will not ignite easily (*DOT 1984).
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires: dry chemical, carbon dioxide, water spray, or foam. For large fires: water spray, fog, or foam. Move container from fire area if possible. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (*DOT 1984).

Special Fire Fighting Procedures: Keep unnecessary people away and isolate hazard area. Stay upwind and keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases and may cause pollution. Cylinder may explode in the heat of fire (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

BENZAL CHLORIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Reacts with water to release hydrochloric acid (*Grant 1974).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in dyes and in the manufacture of benzaldehyde and cinnamic acid (*Hawley 1981).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe vapors. Avoid ingestion and skin contact (see Section III above). For spills or leaks, do not touch material. Stop leak if possible. Use water spray to reduce vapors. For small spills, take up with sand or other noncombustible material and place in containers for later disposal. For small dry spills, place material in clean dry container with shovel and move containers from spill area. For large spills, dike far ahead of spills for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Eye irritation occurs upon exposure (*Grant 1974).

Emergency and First Aid Procedures: 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, immediately flush skin or eyes with water for at least 15 minutes. Speedy removal from skin is essential. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Keep a careful watch since effects may be delayed (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NITROBENZENE

CAS Registry Number: 98-95-3

Synonyms: Benzene, Nitro-; Essence of Mirbane; Essence of Myrbane; Mirbane Oil; NCI-C60082; Nitrobenzol; Oil of Mirbane; Oil of Myrbane

Chemical Formula: $C_6H_5NO_2$

Molecular Weight: 123.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 10,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 411.4°F, 210.8°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.2037 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): 1 at 44.4°C (*Sax 1979)

Melting Point: 42°F, 5.7°C (*Weast 1979)

Vapor Density (AIR=1): 4.3 (NFPA 1984, p. 325M-74)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in about 500 parts water (*Merck 1976)

Appearance and Odor: Greenish-yellow crystals or yellow, oily liquid (*Hawley 1977) with an odor of volatile oil almond (*Merck 1976).

NITROBENZENE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 ppm (5 mg/m^3) (NIOSH 1987, p. 174)

ACGIH TLV: TWA 1 ppm (5 mg/m^3) (skin) (ACGIH 1986-87, p.25)

IDLH: 200 ppm (NIOSH/OSHA 1978, p. 140)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Gosselin 1976)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Can cause death due to respiratory failure (*Arena 1974). Classified as extremely toxic. The mean lethal oral dose is probably between 1 and 5 grams. Systemic effects may be delayed for a few hours (Gosselin 1984, p. II-214). This compound is rapidly absorbed through the skin (Merck 1983, p. 945). It is a powerful methemoglobin former (*Patty 1963).

Medical Conditions Generally Aggravated by Exposure: Ethyl alcohol aggravates intoxication caused by nitrobenzene exposure (Gosselin 1984, p. II-214).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 88°C (CC) (*Sunshine 1969)
Flammable Limits:
LEL: 1.8% (*Encyc Occupat Health and Safety 1971)
UEL: Not Found

Extinguishing Methods: Use water spray, dry chemical, foam, or carbon dioxide (NFPA 1984, pp. 49-67).

Special Fire Fighting Procedures: Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Moderate explosion hazard when exposed to heat or flame. Reacts violently with nitric acid, aluminum trichloride plus phenol, aniline plus glycerine, silver perchlorate and nitrogen tetroxide (Sax 1984, p. 2010).

NFPA Flammability Rating: 2

NITROBENZENE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Sunlight (*Sax 1975), physical damage to container, freezing, and intense heat (NFPA 1984, pp. 49-67).

Incompatibility (Materials to Avoid): Aluminum trichloride; aniline; gycerol; sulfuric acid; oxidants; phosphorus pentachloride; potassium; potassium hydroxide (Sax 1984, p. 2010)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a solvent for cellulose ethers; modifying esterification of cellulose acetate; ingredient of metal polishes (*Hawley 1977), in soaps and shoe polishes; for refining lubricating oils; manufacturing of pyroxylin compound (*Merck 1976); a preservative in spray paints; constituent of floor polishes; substitute for almond essence; in perfume industry (*Browning 1965); chemical intermediate for aniline and dichloroanilines (*SRI). Registered as an insecticide for use on cadavers (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors (DOT 1984, Guide 55). Absorb spilled materials in vermiculite, dry sand, earth, or similar material, and place in sealed containers for disposal in secured sanitary landfill (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

NITROBENZENE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
CPE	GOOD/LIMITED
Neoprene	POOR/MANY
Nitrile	POOR/MANY
PVC	POOR/LIMITED*
Teflon	GOOD/LIMITED
Viton	EXCELLENT/MANY
Viton/Chlorobutyl	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for NITROBENZENE

(98-95-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Greenish-yellow crystals or yellow, oily liquid.

Odor - Almondlike.

Uses - Solvent for metal, shoe, and floor polishes; lubricating oils, spray paints, soaps, perfumes, insecticides, chemical intermediate.

Other Names - Mirbane oil, nitrobenzol.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, 1% methylene blue.

Signs and Symptoms of Acute Nitrobenzene Exposure:

Warning: *Effects may be delayed. Caution is advised. Prior alcohol consumption aggravates the effects of nitrobenzene poisoning.*

Note: Absorption of nitrobenzene through the skin is rapid.

Signs and symptoms of acute exposure to nitrobenzene may be severe and include cyanosis (blue tint to the skin and mucous membranes), tachycardia (rapid heart rate), hypotension (low blood pressure), and cardiac arrhythmias. Respiratory depression and respiratory failure may also occur. Headache, lethargy, weakness, vertigo (dizziness), severe depression, and coma may be noted. Gastrointestinal symptoms include nausea and vomiting. Urine and vomitus may have the odor of bitter almonds.

NITROBENZENE

Emergency Life-Support Procedures:

Acute exposure to nitrobenzene may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to nitrobenzene.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to nitrobenzene.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

NITROBENZENE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of nitrobenzene is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of nitrobenzene may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETHYL-p-PHENYLENEDIAMINE

CAS Registry Number: 99-98-9

Synonyms: N,N-Dimethyl-p-Benzenediamine; 1,4-Benzenediamine, N,N-Dimethyl-; 4-(Dimethylamino)Aniline; 4-Amino-N,N-Dimethylaniline; CI 76075; Dimethyl-para-Phenylenediamine; Dimethyl-paraphenylenediamine; DMPD; N,N-Dimethyl-1,4-Benzenediamine; N,N-Dimethyl-1,4-Phenylenediamine; N,N-Dimethyl-p-Phenylenediamine; p-(Dimethylamino)Aniline; p-Amino-N,N-Dimethylaniline; p-Aminodimethylaniline; p-Dimethylaminophenylamine; p-Phenylenediamine, N,N-Dimethyl-

Chemical Formula: $C_8H_{12}N_2$

Molecular Weight: 136.22

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (guinea pig) 0.0013 mg/liter (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 504°F, 262°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.036 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: 127°F, 53°C (*Merck 1976); also stated as 106°F, 41°C (Merck 1983, p. 474)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

DIMETHYL-p-PHENYLENEDIAMINE

SECTION II (continued)

Solubility in Water: Soluble (*Merck 1976)

Appearance and Odor: Colorless to reddish-violet solid (*Hawley 1977, *Merck 1976)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Hawley 1977)
Skin: Yes (Sax 1984, p. 1190)
Ingestion: Yes (*Hawley 1977)

Health Hazards (Acute, Delayed, and Chronic): Lowest toxic dose with skin effect is 14 mg/kg (*NIOSH/RTECS 1985). Irritant to skin and eyes (*Hawley 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1190).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Hawley 1977)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

DIMETHYL-p-PHENYLENEDIAMINE

SECTION V (continued)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1190).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the production of methylene blue and photodeveloper. It is a reagent for hydrogen sulfide, cellulose, organic synthesis (*Hawley 1977). Chemical intermediate for dyes and diazonium chloride salts; analytical reagent for chloroamine detection in water (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Nonspecific -- Phenylenediamine). Do not touch material; stop leak if it can be done without risk. Keep unnecessary people away. Isolate area and deny entry. Stay upwind and out of low areas. For small spills, use shovel to place material into clean, dry container and cover; move containers from spill area. For large spills, dike far ahead to collect for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Nitrile	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

DIMETHYL-p-PHENYLENEDIAMINE

SECTION IX (continued)

Emergency and First Aid Procedures: Treatment is as for general poisoning. Seek medical attention. Establish respiration. Prevent absorption. Induce vomiting. In case of skin contamination decontaminate with water and soap. In case of eye exposure, flush thoroughly with water (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZENE, 1-(CHLOROMETHYL)-4-NITRO-

CAS Registry Number: 100-14-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, page 771): p-Nitrobenzyl Chloride; Toluene, alpha-Chloro-p-Nitro-; alpha-Chloro-p-Nitrotoluene

Chemical Formula: $C_7H_6ClNO_2$

Molecular Weight: 171.59

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rat) 0.28 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 159.8°F, 71°C (Weast 1979, p. C-522)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1979, p. C-522)

Appearance and Odor: Not Found

BENZENE, 1-(CHLOROMETHYL)-4-NITRO-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 748)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 748)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Chloronitrotoluene) Poisonous if swallowed or dust is inhaled (DOT 1984, Guide 53).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Chloronitrotoluene) This material may burn but does not ignite readily. Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: Water spray, fog or foam. Move container from fire area if you can do it without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Chloronitrotoluene) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Incompatible with sodium hydroxide (Sax 1984, p. 748).

BENZENE, 1-(CHLOROMETHYL)-4-NITRO-

SECTION V (continued)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Chloronitrotoluene)
Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. If water pollution occurs, notify appropriate authorities. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for alter disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
CPE	GOOD/LIMITED**
Nitrile	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

BENZENE, 1-(CHLOROMETHYL)-4-NITRO-

SECTION IX -- EMERGENCY TREATMENT INFORMATION (continued)

Emergency and First Aid Procedures: (Non-Specific -- Chloronitrotoluene) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin and eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

COMMENTS

Sources searched but no information found:

Hawley 1981
Merck 1983
Student 1981
Weiss 1980
Doull 1980
Clayton and Clayton 1981-82
Gosselin 1984
Encyc Occupat Health and Safety 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZYL CHLORIDE

CAS Registry Number: 100-44-7

Synonyms: (Chloromethyl)Benzene; alpha-Chlorotoluene; Benzene, (Chloromethyl)-; Chloromethylbenzene; Chlorophenylmethane; NCI-CO6360; omega-Chlorotoluene; Toluene, alpha-Chloro-; Tolyl Chloride

Chemical Formula: C_7H_7Cl

Molecular Weight: 126.58

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.416 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds) (statutory); 100 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 354°F, 179°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.100 at 20°C/20°C (*Merck 1983)

Vapor Pressure (mmHg): 1 at 22°C (*IARC 1985)

Melting Point: -45 to -54°F, -43 to -48°C (*Merck 1983)

Vapor Density (AIR=1): 4.4 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Merck 1983)

Appearance and Odor: Colorless to slightly yellow liquid (*NFPA 1978); irritating odor (*Merck 1983)

BENZYL CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 ppm (5 mg/m^3) (OSHA 1984, p. 661)

ACGIH TLV: TWA 1ppm (5 mg/m^3) (ACGIH 1986-87, p.10)

IDLH: 10 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: Occupational exposure recommended standard -- air: ceiling concentration 5 mg/m^3/15 minutes (*NIOSH/RTECS 1985)

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Intensely irritating to skin, eyes, and mucous membranes (*Merck 1983). Highly toxic; may cause death or permanent injury after very short exposure to small quantities (*Sax 1975). Has been listed as a direct-acting or primary carcinogen (*Doull 1980). Large doses cause central nervous system depression (*Merck 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 153°F, 67°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 1.1% (*NFPA 1978)
UEL: Not Found

Extinguishing Methods: Use water spray, dry chemical, foam, or carbon dioxide (*NFPA 1978). Use water to keep fire-exposed containers cool (*NFPA 1978).

Special Fire Fighting Procedures: Areas may be entered freely with full-faced mask, self-contained breathing apparatus which provides eye protection, rubber gloves, and hand and arm protection (*NFPA 1978).

Unusual Fire and Explosion Hazards: It burns but does not ignite readily. It may ignite combustibles (DOT 1984, Guide 59).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Keep separate from oxidizing materials (*Sax 1979). May become unstable at elevated temperatures and pressures; may react with water resulting in some nonviolent release of energy (*NFPA 1978).

BENZYL CHLORIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Incompatible with active metals such as copper, aluminum, magnesium, iron, zinc, and tin and keep from strong oxidizing agents (NIOSH/OSHA 1978, p. 50). Avoid acids or acid fumes (*Sax 1979).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic and corrosive fumes. Some organic chlorides decompose to yield phosgene (*Sax 1978).

Hazardous Polymerization: May Occur: Yes (*CHRIS 1978)
May Not Occur:

Conditions to Avoid: Polymerizes with evolution of heat and hydrogen chloride when in contact with all common metals except nickel and lead (*CHRIS 1978).

SECTION VI -- USE INFORMATION

It is used in the manufacturing of perfumes, pharmaceutical products, dyes, synthetic tannins, artificial resins, (*Merck 1983) photographic developer, gasoline gum inhibitors, penicillin precursors (*Hawley 1981). Also, benzyl chloride is used as an intermediate in the manufacture of other organic chemicals (*SRI). In the past, it was used as an irritant gas in chemical warfare (*IARC 1972-1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

If leak or spill has not ignited, use water spray to disperse vapors and to provide protection for persons attempting to stop leak. Use water spray to flush spills away from exposures (*NFPA 1978). Take up small spills with sand or other noncombustible absorbent material and place into containers for later disposal. For larger spills, dike for later disposal (DOT 1984, Guide 59).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

BENZYL CHLORIDE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Butyl/Neoprene	POOR/LIMITED*
CPE	POOR/LIMITED*
Neoprene	POOR/LIMITED*
Nitrile	GOOD/LIMITED*
PVC	POOR/LIMITED*
Teflon	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for BENZYL CHLORIDE

(100-44-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to slightly yellow liquid.

Odor - Irritating, pungent.

Commercial Form - Liquid in 475-pound nickel drums, 100-pound carboys, tank trucks, tank cars.

Uses - Manufacture of perfumes, pharmaceuticals, dyes, synthetic tannins, artificial resins, and gasoline gum inhibitors; photographic developer; chemical warfare agent.

Materials to Avoid - Water (except for use in emergency life support).

Caution: *Benzyl chloride may liberate toxic gas upon decomposition. Contact with water may result in the formation of hydrogen chloride gas.*

Other Names - Alpha-chlorotoluene, (chloromethyl)benzene, chlorophenylmethane, omega-chlorotoluene, tolyl chloride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Benzyl Chloride Exposure:

Benzyl chloride may be very irritating to the skin, eyes, and mucous membranes. Eye irritation may be severe, and permanent eye damage may result. Lacrimation (tearing) is common. Other signs and symptoms of acute exposure may include headache, dizziness, weakness, fatigue, irritability, itching of the skin, profuse sweating, insomnia, tremors, unsteadiness, and central nervous system depression. Gastrointestinal effects may include nausea, vomiting, cramps, anorexia, and diarrhea. Pulmonary edema and disturbance of liver function may also occur.

BENZYL CHLORIDE

Emergency Life-Support Procedures:

Acute exposure to benzyl chloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to benzyl chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to benzyl chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

BENZYL CHLORIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOCYANIC ACID, 3,4-DICHLOROPHENYL ESTER

CAS Registry Number: 102-36-3

Synonyms: 3,4-Dichlorophenyl Isocyanate; Benzene, 1,2-Dichloro-4-Isocyanato-

Chemical Formula: $C_7H_3Cl_2NO$

Molecular Weight: 188.01

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse) 0.14 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 244°F, 118°C at 18 mmHg (Beilstein 1954, Vol. 12/3, p. 1405)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 113°F, 45°C (Beilstein 1954, Vol. 12/3, p. 1405)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: White to yellow solid (*Hawley 1977)

ISOCYANIC ACID, 3,4-DICHLOROPHENYL ESTER

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (DOT 1984, Guide 53)
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Strong irritant to tissue, especially eyes and mucous membranes (*Hawley 1977)

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: Inhalation of dust poisonous; fire may produce irritating or poisonous gases (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

ISOCYANIC ACID, 3,4-DICHLOROPHENYL ESTER

SECTION V (continued)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate; organic synthesis (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation of dust (see Section III above). Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENYLTHIOUREA

CAS Registry Number: 103-85-5

Synonyms: Urea, 1-Phenyl-2-Thio-; 1-Phenyl-2-Thiourea; 1-Phenylthiourea; alpha-Phenylthiourea; N-Phenylthiourea; NCI-C02017; Phenylthiocarbamide; PTC; PTU; Thiourea, Phenyl-; U6324; USAF EK-1569

Chemical Formula: $C_7H_8N_2S$

Molecular Weight: 152.22 (*Merck 1983)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.3 (*Merck 1983)

Vapor Pressure (mmHg): Not Found

Melting Point: 148°C (Aldrich 1986, p.1083)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 400 parts cold water; 17 parts boiling water (*Merck 1983).

Appearance and Odor: Needle-like crystals (Sax 1984, p. 2205).

PHENYLTHIOUREA

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (Sax 1984, p. 2205)

Health Hazards (Acute, Delayed, and Chronic): It is classified as *extremely toxic. The probable oral lethal dose is 5-50 mg/kg* or between 7 drops and 1 teaspoon for a 70 kg (150 lb.) person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Dangerous disaster hazard; emits toxic fumes of oxides of sulfur and nitrogen when heated to decomposition (Sax 1984, p. 2205).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Acid or acid fumes (Sax 1984, p. 2205)

Hazardous Decomposition or Byproducts: When heated to decomposition, or on contact with acid or acid fumes it emits highly toxic fumes of sulfur oxides and nitrogen oxides (Sax 1984, p. 2205).

PHENYLTHIOUREA

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacture of rodenticides (*Gosselin 1976) and in medical genetics (Merck 1983, p. 1794).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation or contact with skin (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Exposure may result in vomiting, difficult breathing, noisy breathing, cyanosis, and low body temperature (*Gosselin 1976).

Emergency and First Aid Procedures: Phenylthiourea is similar to Antu (Gosselin 1984, p. II-350). Dermal exposure: wash exposed area twice with soap and water. Eye exposure: wash copiously with water for 15 minutes. Inhalation: remove to fresh air (*Rumack 1975 to Present). Oral: Induce vomiting (Gosselin 1984, p. III-41).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- EPICHLOROHYDRIN

CAS Registry Number: 106-89-8

Synonyms: (Chloromethyl)Ethylene Oxide; (DL)-alpha-Epichlorohydrin; 1,2-Epoxy-3-Chloropropane; 1-Chloro-2,3-Epoxypropane; 2,3-Epoxypropyl Chloride; 3-Chloro-1,2-Epoxypropane; 3-Chloro-1,2-Propylene Oxide; Alpha-Epichlorohydrin; Chloromethyloxirane; Chloropropylene Oxide; ECH; Epichlorophydrin; Epichlorhydrin; gamma-Chloropropylene Oxide; Glycerol Epichlorhydrin; Glycerol Epichlorohydrin; Glycidyl Chloride; NCI-CO7001; Oxirane, (Chloromethyl)-; Oxirane, 2-(Chloromethyl); SKEKHG

Chemical Formula: C_3H_5ClO

Molecular Weight: 92.53

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000 (pounds)

RQ: 1,000 (pounds) (statutory); 100 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 241.7°F, 116.5°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.801 at 20°C/4°C (*Weast 1979); 1.18 at 20°C (Merck 1983, p. 520)

Vapor Pressure (mmHg): 10 at 16.6°C (*Sax 1975)

Melting Point: -54.4°F, -48°C (*Weast 1979); -14.1°F, -25.6°C (Merck 1983, p. 520)

Vapor Density (AIR=1): 3.29 (*Sax 1975)

EPICHLOROHYDRIN

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble in water (*Merck 1976)

Appearance and Odor: Colorless liquid (*Sax 1975) with a pungent, garlic, sweet odor (*CHRIS 1978).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 ppm (19 mg/m^3) (NIOSH 1987 p.114)

ACGIH TLV: TWA 2 ppm (10 mg/m^3) (to be changed) (skin) (ACGIH 1986-87, p.18)

IDLH: 100 ppm (NIOSH/OSHA 1978, p. 92)

Other Limits Recommended: NIOSH: Lowest feasible limit; potential occupational carcinogen (NIOSH 1987, p. 114)

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): This compound is caustic as both a liquid and gas. Irritation of the eyes and skin, and skin sensitization has been observed (*LeFaux 1968; *Sax 1975). Exposure to epichlorohydrin has caused inflammation of the lungs, asthmatic bronchitis, and liver and kidney damage (*Gosselin 1976; *Sax 1975). In acute poisonings, death may be caused by respiratory paralysis (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 93°F(CC) (*ACGIH 1980); 105°F(OC) (*Merck 1983)

Flammable Limits:
LEL: 3.8% (*NFPA 1978)
UEL: 21.0% (*NFPA 1978)

Extinguishing Methods: Use water spray, dry chemical, foam or carbon dioxide. Water spray may be used to dilute spills to non-flammable mixtures. If leak or spill has not ignited, use water spray to disperse the vapors. Keep fire-exposed containers cooled with water (*NFPA 1978).

Special Fire Fighting Procedures: If fire becomes uncontrollable, or containers are exposed to direct flames, evacuate for a radius of 1,500 feet (*Student 1981). Isolate for one-half mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 30). Epichlorohydrin may react violently with water (*NFPA 1978).

EPICHLOROHYDRIN

SECTION IV (continued)

Unusual Fire and Explosion Hazards: When heated to decomposition, this compound evolves highly toxic fumes of phosgene (*Sax 1975) and carbon monoxide (*General Electric Co. MSDS #335B 1979).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Heat and contaminants (*NFPA 1978).

Incompatibility (Materials to Avoid): Reactive and incompatible with strong oxidizers, strong acids, caustics, zinc, aluminum, chlorides of iron and aluminum (*NIOSH/OSHA 1978*, p. 92), and compounds with an active hydrogen atom, including water (*ITI 1982).

Hazardous Decomposition or Byproducts: When heated, can evolve fumes of phosgene (*Sax 1975) and carbon monoxide (*General Electric Co. MSDS #335B 1979).

Hazardous Polymerization: **May Occur:** Yes (*CHRIS 1978)
May Not Occur:

Conditions to Avoid: Strong acids and bases (*CHRIS 1978); certain curing agents such as ethylenediamine (*General Electric Co. 1979, MSDS #335B).

SECTION VI -- USE INFORMATION

Insect fumigant, solvent (*Merck 1976), raw material or intermediate for chemical synthesis, cross-linking agent, heat stabilizer for plastics, comonomer for epoxy resins (*SRI), papermaking additive (*Kirk-Othmer 1978). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors; do not get water inside container. Small spills: flush area with flooding amounts of water. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 30).

EPICHLOROHYDRIN

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
CPE	POOR/LIMITED*
Neoprene	POOR/LIMITED
Nitrile	POOR/LIMITED
PE	POOR/MANY
PVC	POOR/LIMITED
Saranex	POOR/LIMITED
Teflon	EXCELLENT/MANY
Viton	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for EPICHLOROHYDRIN

(106-89-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Pungent, sweet, or chloroformlike.

Commercial Form - Liquid shipped in drums or tank cars.

Uses - Manufacture of glycerol, epoxy resins, and pesticides; cross-linking agent and heat stabilizer for plastics; stabilizer in chlorine-containing materials; chemical synthesis; solvent.

Materials to Avoid - Oxidizers, acids, caustic substances, water (except for use in emergency life support).

Other Names - 1-Chloro-2,3-epoxypropane, chloromethyloxirane, glycerol epichlorohydrin, glycidyl chloride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, dopamine, norepinephrine, furosemide.

Signs and Symptoms of Acute Epichlorohydrin Exposure:

Warning: *Effects may be delayed for several hours. Caution is advised.*

Acute exposure to epichlorohydrin may result in nausea, vomiting, and abdominal pain. Liver and kidney effects may be observed. The respiratory tract may become irritated, dyspnea (shortness of breath) may occur, and in acute cases, respiratory paralysis has been observed. Central nervous system and respiratory depression have been noted. Facial swelling, mucosal irritation, dermatitis (red, inflamed skin), and eye irritation may also occur following exposure to epichlorohydrin.

EPICHLOROHYDRIN

Emergency Life-Support Procedures:

Acute exposure to epichlorohydrin may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to epichlorohydrin.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to epichlorohydrin.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

EPICHLOROHYDRIN

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of epichlorohydrin is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPARGYL BROMIDE

CAS Registry Number: 106-96-7

Synonyms: Propyne, 3-Bromo-; gamma-Bromoallylene; 3-Bromopropyne; 3-Bromo-1-propyne

Chemical Formula: C_3H_3Br

Molecular Weight: 118.97

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 0.029 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 190-194°F, 88-90°C (Sax 1984, p. 2295)

Specific Gravity (H_2O=1): 1.564-1.570 (Sax 1984, p. 2295)

Vapor Pressure (mmHg): Not Found

Melting Point: -77.9°F, -61.07°C (Sax 1984, p. 2295)

Vapor Density (AIR=1): 4.10 (NFPA 1984, p. 325u-81)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Colorless liquid, sharp odor (Sax 1984, p. 2295)

PROPARGYL BROMIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (Sax 1984, p. 2295)

Health Hazards (Acute, Delayed, and Chronic): This material is very toxic via the oral route (Sax 1984, p. 2295). If inhaled, may be harmful; contact may cause burns to skin and eyes (DOT 1984, Guide 29).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 50°F, 10°C (NFPA 1984, p. 325u-81)
Flammable Limits:
LEL: 3.0% (*NFPA 1978)
UEL: Not Found

Extinguishing Methods: Use water, foam, carbon dioxide, or dry chemical (Sax 1984, p. 2295)

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and full protective clothing. Move container from fire area if you can do it without risk. Do not get water inside container. Cool containers that are exposed to flames with water from the side until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: This material detonates at 428°F, 220°C or more; ignites by impact. Emits highly toxic fumes of bromides when heated to decomposition (Sax 1984, p. 2295).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (Sax 1984, p. 2295)
Stable:

Conditions to Avoid: Heat, flame, shock, and other chemicals (Sax 1984, p. 2295)

PROPARGYL BROMIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Reacts vigorously with oxidizing materials. Becomes shock-sensitive when mixed with chloropicrin (Sax 1984, p. 2295).

Hazardous Decomposition or Byproducts: Highly toxic fumes of bromine containing compounds are formed when this material is heated to decomposition (Sax 1984, p. 2295).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a soil fumigant (Hawley 1981, p. 861). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources; no flames, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors, do not get water inside container. Take up spills with sand or noncombustible absorbent material. For large spills dike far ahead (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include skin irritation and tearing of the eyes (*NFPA 1978).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 29).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ACROLEIN

CAS Registry Number: 107-02-8

Synonyms: Acraldehyde; Acrylaldehyde; Acrylic Aldehyde; Allyl Aldehyde; Aqualin; Aqualine; Ethylene Aldehyde; Magnacide H; NSC 8819; Propenal; 2-Propenal; Prop-2-en-1-al; 2-Propen-1-one

Chemical Formula: C_3H_4O

Molecular Weight: 56.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.15 mg/liter/6 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 126°F, 52.5°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.8389 at 20°C; 0.8621 at 0°C (*Merck 1983)

Vapor Pressure (mmHg): 210 at 68°F, 20°C; 135.71 at 50°F, 10°C (*Weed Science Society of America 1974)

Melting Point: -126°F, -88°C (*Merck 1983)

Vapor Density (AIR=1): 1.94 (*Encyc Occupat Health and Safety 1983)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 2-3 parts water (*Merck 1983)

Appearance and Odor: Colorless or yellowish liquid with extremely sharp, disagreeable, acrid, irritating odor (*Sax 1979, *CHRIS 1980)

ACROLEIN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 ppm (0.25 mg/m^3) (NIOSH 1987, p. 44)

ACGIH TLV: TWA 0.1 ppm (0.25 mg/m^3); STEL 0.3 ppm (0.8 mg/m^3) (*ACGIH 1983)

IDLH: 5 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: EEGL 0.05 ppm (60 minutes) (NRC 1984a, pp. 27-34)

Routes of Entry: **Inhalation:** Yes (*NIOSH/RTECS 1985)
Skin: Yes (*NIOSH/RTECS 1985)
Ingestion: Yes (*Gosselin 1984)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic; probable oral human lethal dose is 5-50 mg/kg, between 7 drops and one teaspoon for a 70 kg (150 lb.) person (*Gosselin 1984). Inhalation of air containing 10 ppm of acrolein may be fatal in a few minutes (*NRC 1981). Death from cardiac failure accompanied by hyperemia and hemorrhage of the lungs and degeneration of the bronchial epithelium is possible. Acrolein causes acute respiratory and eye irritation; severe gastrointestinal distress with slowly developing pulmonary edema (lungs fill up with fluid); and skin irritation (Gosselin 1984, p. II-186).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -15°F, -26°C (CC); less than 0°F, -18°C (OC) (*NFPA 1978)
Flammable Limits:
LEL: 2.8% (*NFPA 1978)
UEL: 31% (*NFPA 1978)

Extinguishing Methods: Dry chemical, alcohol foam, or carbon dioxide. Water may be ineffective, but can be used to keep containers cool (*NFPA 1978).

Special Fire Fighting Procedures: In advanced or massive fires, fire fighting should be done from safe distance or from protected location. Use dry chemical, alcohol foam, or carbon dioxide. Water may be ineffective, but should be used to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse vapors. If it is necessary to stop a leak, use water spray to protect men attempting to do so. Water spray may be used to flush spills away from exposures and to dilute spills to nonflammable mixtures (*NFPA 1978). Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 30).

Unusual Fire and Explosion Hazards: Under fire conditions, polymerization may occur. If inside a container, violent rupture of the container may take place (*NFPA 1978).

ACROLEIN

SECTION IV (continued)

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Merck 1983)
Stable:

Conditions to Avoid: Exposure to alkalis or strong acids (*Encyc Occupat Safety and Health 1983) or to oxygen (*NFPA 1978).

Incompatibility (Materials to Avoid): Alkalis or strong acids act as catalysts, causing a condensation reaction and liberating energy. Reaction may be very rapid and violent (*Encyc Occupat Health and Safety 1983). Readily converted by oxygen to hazardous peroxides and acids (*NFPA 1978).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes (*Sax 1975).

Hazardous Polymerization: **May Occur:** Yes (*NFPA 1978)
May Not Occur:

Conditions to Avoid: Elevated temperatures, such as fire conditions. (Polymerization inside container could cause violent rupture of container under fire conditions.) (*NFPA 1978)

SECTION VI -- USE INFORMATION

Acrolein is used in manufacture of colloidal forms of metals; making plastics, perfumes; as a warning agent in methyl chloride refrigerant; and has been used in military poison gas mixtures (*Merck 1983). It is also used as an intermediate in the production of glycerine, methionine, acrylic acid, and esters (*SRI). Acrolein is also an intermediate for glycerol, polyurethane, polyester resins, and pharmaceuticals (*Hawley 1981). Additionally, acrolein is used as an aquatic herbicide, biocide, slimicide (*Farm Chemicals Handbook 1984) and molluscicide (*Kearney and Kaufman 1975).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

When handling acrolein, no skin surface should be exposed (*NFPA 1978). Remove all ignition sources. Ventilate area of spill or leak. For large quantities, cover with sodium bisulfite, add small amount of water and mix. Then, after 1 hour, flush with large amounts of water and wash site with soap solution. Liquid should not be allowed to enter confined space, such as sewer, because of possibility of explosion. Take up spill for disposal by absorbing it in vermiculite, dry sand, or earth and disposing in a secured landfill or combustion chamber (*NIOSH 1981).

ACROLEIN

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
Butyl/Neoprene	POOR/MANY
CPE	POOR/MANY
Nitrile	POOR/MANY
Viton	POOR/MANY
Viton/Chlorobutyl	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ACROLEIN

(107-02-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other competent authority.

Substance Characteristics:

Pure Form - Colorless or slightly yellow liquid.

Odor - Extremely sharp.

Commercial Forms - 92 to 99% pure liquid.

Uses - Chemical intermediate, manufacture of plastics, perfumes, paper, colloidal forms of metals, component of military poison gas mixtures and liquid fuels, antimicrobial agent, aquatic pesticide, warning agent in methyl chloride refrigerant.

Materials to Avoid - Acids, alkali, oxidizers, oxygen (except for use in emergency life support).

Caution: *Acrolein should not be exposed to high temperatures, acids, alkali, or oxidizers. A violent polymerization reaction may result.*

Other Names - Acquinite, acraldehyde, acrylaldehyde, acrylic aldehyde, allyl aldehyde, ethylene aldehyde, Magnacide H, 2-propenal.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Acrolein Exposure:

Warning: *Acrolein is highly irritating to skin and mucous membranes. Caution is advised.*

Signs and symptoms of acute exposure to acrolein may be severe and include shortness of breath, tightness in the chest, pulmonary edema, and coma. Lacrimation (tearing), nausea, vomiting, and diarrhea may also occur. Acrolein will irritate or burn the skin and mucous membranes. Eye contact may cause irritation, swelling, discharge, and/or corneal injury.

ACROLEIN

Emergency Life-Support Procedures:

Acute exposure to acrolein may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to acrolein.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to acrolein.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible (and place in plastic bag).

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

ACROLEIN

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROETHANOL

CAS Registry Number: 107-07-3

Synonyms: 2-Chloroethanol; 2-Chloro-1-ethanol; 2-Chloroethyl Alcohol; 2-Hydroxyethyl Chloride; 2-Monochloroethanol; beta-Chloroethanol; beta-Chloroethyl Alcohol; beta-Hydroxyethyl Chloride; delta-Chloroethanol; Ethanol, 2-Chloro-; Ethene, Chlorohydrin; Ethylchlorohydrin; Ethylene Chlorhydrin; Ethylene Glycol, Chlorohydrin; Glycol Chlorohydrin; Glycol Monochlorohydrin; Glycomonochlorhydrin; NCI-C50135

Chemical Formula: C_2H_5ClO

Molecular Weight: 80.52

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.385 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 262°F, 128°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.197 (*Merck 1983)

Vapor Pressure (mmHg): 4.9 (*Clayton and Clayton 1981-82)

Melting Point: -89.5°F, -67.5°C (*Weast 1979)

Vapor Density (AIR=1): 2.78 (*Patty 1963)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble (*Weast 1979)

CHLOROETHANOL

SECTION II (continued)

Appearance and Odor: Colorless, glycerine-like liquid (*Browning 1965); faint ethereal odor (*Sax 1979); sweet, pleasant odor (*CHRIS 1978)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 ppm (16 mg/m^3) (NIOSH 1987, p. 120)

ACGIH TLV: Ceiling 1 ppm (3 mg/m^3) (skin) (ACGIH 1986-87, p. 18)

IDLH: 10 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Encyc Occupat Health and Safety 1983)
Skin: Yes (*Encyc Occupat Health and Safety 1983)
Ingestion: Yes (*Encyc Occupat Health and Safety 1983)

Health Hazards (Acute, Delayed, and Chronic): Very toxic; probable oral lethal dose in humans is 50-500 mg/kg or between 1 teaspoon and 1 ounce for a 70 kg (150 lb.) person (*Gosselin 1976). Poisoning causes liver and kidney degeneration and irritates mucous membranes; it may be cumulative (*Merck 1983). Several fatal cases with brain edema and lung edema have been reported from industrial exposure by inhalation and skin contact (*Encyc Occupat Health and Safety 1983). It is more toxic by skin contact than orally (*Merck 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 105°F (OC) (*Merck 1983); 140°F, 60°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 4.9% (*NFPA 1978)
UEL: 15.9% (*NFPA 1978)

Extinguishing Methods: Water spray may be used to extinguish the fire because the material can be cooled below its flash point (*NFPA 1978). Alcohol foam, carbon dioxide, and dry chemical may be used (*CHRIS 1978).

Special Fire Fighting Procedures: Do not breathe fumes from burning material. Air purifying respirator or self-contained breathing apparatus, coat, pants, gloves, and boots should be worn. No skin surface should be exposed. Bands around legs, arm and waist should be provided (*NFPA 1978).

Unusual Fire and Explosion Hazards: Its decomposition products will react with water or steam to produce toxic and corrosive fumes (*Sax 1979). Vapors are heavier than air and may flash back to a source of ignition (*CHRIS 1978).

CHLOROETHANOL

SECTION IV (continued)

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits highly toxic fumes of phosgene (*Sax 1979). Hydrogen chloride fumes may be formed (*CHRIS 1978).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Manufacture of insecticides; treating sweet potatoes before planting (*Merck 1983); introduction of hydroxyethyl group in organic synthesis; used as a solvent (*Hawley 1981); employed in separating butadiene from hydrocarbon mixtures (*Clayton and Clayton 1981-82); intermediate for indigo and thiodiethylene glycol (*SRI); used for removal of tar spots; and cleaning agent for machines (*Browning 1965)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Remove all ignition sources. Ventilate area of spill or leak. For small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood). Allow sufficient time for evaporating vapors to completely clear the hood ductwork. Burn the paper in a suitable location away from combustible materials. Large quantities can be collected and atomized in a suitable combustion chamber equipped with an appropriate effluent gas cleaning device. It should not be allowed to enter a confined space, such as a sewer, because of the possibility of an explosion. Absorb it in vermiculite, dry sand, earth or a similar material and dispose in a secured sanitary landfill (*NIOSH/OSHA 1981). Do not touch material and do not expose skin (*CHRIS 1978; *Clayton and Clayton 1981-82).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating,

CHLOROETHANOL

SECTION VIII (continued)

chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
Butyl/Neoprene	POOR/LIMITED*
Neoprene	GOOD/LIMITED
Viton	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CHLOROETHANOL

(107-07-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless, glycerinelike liquid.

Odor - Faint, sweet, pleasant.

Commercial Form - Liquid in bottles, jugs, carboys, or tank cars.

Uses - Chemical intermediate, organic synthesis, manufacture of insecticides, solvent, cleaning agent.

Caution: *When heated to decomposition, highly toxic fumes of phosgene and hydrogen chloride gas may be generated. Refer to the appropriate Emergency First Aid Treatment Guide for these substances.*

Other Names - 2-Chloroethanol, ethylchlorohydrin, ethylene chlorohydrin, glycol chlorohydrin, 2-hydroxyethyl chloride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, dopamine, norepinephrine.

Signs and Symptoms of Acute Chloroethanol Exposure:

Signs and symptoms of acute exposure to chloroethanol may include weakness, dizziness, confusion, visual disturbances, incoordination, shock, seizures, and coma.

Dyspnea (shortness of breath), pulmonary edema, respiratory depression, and respiratory failure may occur. Weak pulse, hypotension (low blood pressure), and cyanosis (blue tint to the skin and mucous membranes) may be observed. Nausea, vomiting, and hematuria (bloody urine) may be seen after exposure. Liver and kidney damage may also occur. Chloroethanol is irritating to the skin and mucous membranes.

CHLOROETHANOL

Emergency Life-Support Procedures:

Acute exposure to chloroethanol may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to chloroethanol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to chloroethanol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

CHLOROETHANOL

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ALLYLAMINE

CAS Registry Number: 107-11-9

Synonyms: 2-Propen-1-amine; 2-Propenylamine; 3-Amino-1-Propene; 3-Aminopropene; 3-Aminopropylene; Monoallylamine

Chemical Formula: C_3H_7N

Molecular Weight: 57.09

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mammal) 0.32 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 131-136°F, 55-58°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.76 at 20°C/20°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): 2.0 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Merck 1976)

Appearance and Odor: A colorless to light yellow liquid (*NFPA 1984), strong ammonia odor (*Merck 1976).

ALLYLAMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*NFPA 1978)
Skin: Yes (*NFPA 1978)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Acute: an eye, skin, and respiratory tract irritant (*NFPA 1978) which is highly toxic if inhaled or ingested and moderately toxic if absorbed on skin. Ingestion or inhalation may cause death or permanent injury after very short exposure to small quantities. Skin absorption may cause irreversible and reversible changes (*Sax 1975). Toxic air concentration (TC_{lo}) in humans is 5 ppm over 5 minutes (*NIOSH/RTECS 1985). Vapors are extremely unpleasant and may ensure voluntary avoidance of dangerous concentrations (*Grant 1974). Will irritate nose and throat at 2.5 ppm (*Patty 1963).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -20°F (CC) (*NFPA 1978)
Flammable Limits:
LEL: 2.2% (*NFPA 1978)
UEL: 22% (*NFPA 1978)

Extinguishing Methods: Wear self-contained breathing apparatus and full protective clothing (*NFPA 1978). Use dry chemical, alcohol foam, or carbon dioxide. Water may be used to keep exposed containers cool (*NFPA 1978). Dike fire control water for later disposal. Withdraw immediately in case of rising sound from venting safety device or discoloration of tank due to fire (*DOT 1984).

Special Fire Fighting Procedures: Keep unnecessary people away and isolate hazard area. Stay upwind and keep away from low areas. Isolate for 1/2 mile in all directions if tank car or truck is involved (*DOT 1984).

Unusual Fire and Explosion Hazards: Flammable when exposed to heat, sparks, or flame (*Sax 1975). Vapor forms explosive mixtures with air over a wide range. Use caution when approaching fire and applying water (*NFPA 1978). Vapor explosion and poison hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard (*DOT 1984). Can react with oxidizing materials. When heated to decomposition, it emits toxic fumes (*Sax 1975).

ALLYLAMINE

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA (continued)

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Avoid heating to decomposition (*Sax 1978). May become unstable at elevated temperatures and pressures or may react with water with non-violent release of energy (*NFPA 1978).

Incompatibility (Materials to Avoid): Oxidizing materials (*Sax 1975).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a chemical intermediate for mercurial diuretics (*SRI), as a pharmaceutical intermediate and in organic synthesis (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

For leaks or spills, use water spray to disperse vapors and protect men attempting to stop leak. Water spray may be used to flush spills away from exposures and to dilute spills to nonflammable mixtures (*NFPA 1978). Shut off ignition sources and keep away all flames, smoking, or flares. Do not touch spilled material. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. For large spills, dike far ahead for later disposal (*DOT 1984). Local exhaust or general ventilation methods should be used in enclosed spaces (*Sax 1975). Do not breathe vapors (See Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

ALLYLAMINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
PVC	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include irritation of nose, eyes, and mouth with tearing, runny nose, and sneezing (*Patty 1963). Can cause excitement, convulsions, and death (*Merck 1976).

Emergency and First Aid Procedures: Move victim to fresh air and call emergency medical care. Remove and isolate contaminated clothing and shoes at site. In case of contact, flush skin or eyes with water for 15 minutes. Keep victim quiet and maintain normal body temperature. Keep victim under careful watch since effects may be delayed (DOT 1984, Guide 28).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPIONITRILE

CAS Registry Number: 107-12-0

Synonyms: Cyanoethane; Ether Cyanatus; Ethyl Cyanide; Hydrocyanic Ether; Propanenitrile; Propionic Nitrile; Propiononitrile; Propylnitrile

Chemical Formula: C_3H_5N

Molecular Weight: 55.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.37 mg/liter/hour (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 207°F, 97.2°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.8020 at 0°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 40 at 22°C (*Clayton and Clayton 1981-82)

Melting Point: -133°F, -91.8°C (*Merck 1983)

Vapor Density (AIR=1): 1.9 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 11.9 g/100 ml at 40°C (*Merck 1983)

Appearance and Odor: Colorless (*Clayton and Clayton 1981-82) liquid (Hawley 1981, p. 1428); pleasant, ethereal, sweetish odor (*Merck 1983)

PROPIONITRILE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Occupational exposure to nitriles recommended standard, air: TWA 14 mg/m^3 (*NIOSH/RTECS 1985). Maximum allowable concentration (USSR) 0.3 mg/m^3 (as HCN) (Encyc Occupat Health and Safety 1983, p. 1445).

Routes of Entry: **Inhalation:** Yes (*Deichman 1969)
Skin: Yes (*Deichman 1969)
Ingestion: Yes (Sax 1984, p. 2300)

Health Hazards (Acute, Delayed, and Chronic): It is highly toxic (*Encyc Occupat Health and Safety 1981). This super toxic compound has a probable oral lethal dose in humans of less than 5 mg/kg or a taste (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976). It is a mild to moderate skin and eye irritant (Weiss 1980, p. 1145).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 2°C (CC) (*Bretherick 1979)
Flammable Limits:
LEL: 3.1% (*Bretherick 1979)
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, and foam. Large fires: water spray, fog, or foam. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Cool containers that are exposed to flames with water from the side until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides and cyanide (Sax 1984, p. 2300). It is a flammable/combustible material and 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 and poison hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 28).

PROPIONITRILE

SECTION IV (continued)

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: May become unstable at elevated temperatures and pressures (*NFPA 1978).

Incompatibility (Materials to Avoid): Generates cyanide ions (*Peer Review Committee). Poisonous on contact with acids (*Merck 1983).

Hazardous Decomposition or Byproducts: Poisonous when heated to decomposition (*Merck 1983). When heated to decomposition, it emits toxic fumes of nitrogen oxides and cyanides (Sax 1984, p. 2300).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a setting agent for resins; a raw material for some medicines (*Rumack 1975 to Present) and a chemical intermediate for di-n-propylamine (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors and skin contact (see Section III above). Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PROPIONITRILE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
PVC	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Can cause death (*NFPA 1978). Exposure results in headache, dizziness, rapid pulse, deep-rapid breathing, nausea, vomiting, unconsciousness, convulsions and sometimes death (*Rumack 1975 to Present). Chronic exposure over long periods may cause fatigue and weakness (*Merck 1968). Can cause same general symptoms as hydrogen cyanide but onset of symptoms is likely to be slower (*Clayton and Clayton 1981-82). Contact may cause burns to skin and eyes (DOT 1984, Guide 28).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 28).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ACRYLONITRILE

CAS Registry Number: 107-13-1

Synonyms: 2-Propenenitrile; Acrylon; Acrylonitrile Monomer; Cyanoethylene; ENT 54; Fumigrain; Miller's Fumigrain; NCI-C50215; Propenenitrile; TL 314; VCN; Vinyl Cyanide

Chemical Formula: C_3H_3N

Molecular Weight: 53.60

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 10,000 (pounds)

RQ: 100 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 171°F, 77.3°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.8004 at 25°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 100 at 23°C (*IARC 1972-1985)

Melting Point: -116°F, -82.0°C (*Sax 1979)

Vapor Density (AIR=1): 1.9 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 7.35 parts dissolve in 100 parts water at 20°C (*Merck 1983)

ACRYLONITRILE

SECTION II (continued)

Appearance and Odor: Clear, colorless liquid (some technical grades slightly yellow) with a very slight odor of peach pits (*Clayton and Clayton 1981-82; *Lefaux 1968)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 2 ppm; Ceiling 10 ppm/15 minutes (NIOSH 1987, p. 46)

ACGIH TLV: TWA 2 ppm (4.5 mg/m^3) (skin) (ACGIH 1986-87, p. 9)

IDLH: 500 ppm (NIOSH/OSHA Joint Standards Completion Project, 1975)

Other Limits Recommended: Industrial substance suspect of carcinogenic potential for man (ACGIH 1986-87, p. 40). NIOSH: 1 ppm 8-hour TWA, 10 ppm 15-minute ceiling; potential occupational carcinogen (NIOSH 1987, p. 46)

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): It is classified as very toxic. Probable oral lethal dose for human is 50-500 mg/kg (between 1 teaspoon and 1 oz.) for a 70 kg (150 lb.) person. Irritant skin dose -- 500 mg. Toxic concentrations have been reported at 16 ppm/20 min. (*Gosselin 1976). Acute toxicity is similar to that due to cyanide poisoning and the level of cyanide ion in blood is related to the level of poisoning (*Clayton and Clayton 1981-82). Inhalation or ingestion results in collapse and death due to tissue anoxia (lack of oxygen) and cardiac arrest (heart failure) (*Encyc Occupat Health and Safety 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 32°F, 0°C (*Merck 1983)
Flammable Limits:
LEL: 3% (*NFPA 1978)
UEL: 17% (*NFPA 1978)

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Stay away from ends of tanks. Do not get water inside container. Cool containers that are exposed to flames with water from the side until well after fire is out. 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 (*DOT 1984).

Special Fire Fighting Procedures: In advanced or massive fires, fire fighting should be done from a safe distance or a protected location (*NFPA

ACRYLONITRILE

SECTION IV (continued)

1978). Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (*DOT 1984).

Unusual Fire and Explosion Hazards: Materials are too dangerous to health to expose fire fighters. A few whiffs of vapor could cause death or vapor or liquid could be fatal on penetrating the fire fighter's normal full protective clothing. The normal full protective clothing and breathing apparatus available to the average fire department will not provide adequate protection against inhalation or skin contact with these materials (*NFPA 1978). Explosion hazard is moderate. It is flammable and explosive at normal room temperatures (*Encyc Occupat Health and Safety 1971). Can react violently with strong acids, amines, strong alkalis (*Sax 1979). Vapors may travel considerable distance to source of ignition and flash back. Dilute solutions are also hazardous (flash point of a solution of 2 percent in water is 70°F) (*NFPA 1978).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Clayton and Clayton 1981-82)
Stable:

Conditions to Avoid: Moderate hazard is possible when it is exposed to flames, strong acids, amines and alkalis (*Sax 1979).

Incompatibility (Materials to Avoid): Avoid strong acids, amines, alkalis (*Sax 1979). Also, incompatible with strong oxidizers (especially bromine) copper and copper alloys (NIOSH/OSHA 1978, p. 42).

Hazardous Decomposition or Byproducts: When heated or burned, toxic hydrogen cyanide gas and oxides of nitrogen are formed (*CHRIS 1978).

Hazardous Polymerization: **May Occur:** Yes (*NFPA 1978)
May Not Occur:

Conditions to Avoid: May polymerize spontaneously in the container, particularly in absence of oxygen or on exposure to visible light (*Merck 1983). If polymerization occurs in containers, there is a possibility of violent rupture (*NFPA 1978).

SECTION VI -- USE INFORMATION

Used primarily in plastics manufacturing as a copolymer and comonomer (*SRI); to improve dye and working properties of acrylic fibers (*Hamilton 1974); formerly used as a fumigant for food commodities (*Farm Chemicals Handbook 1983).

ACRYLONITRILE

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch material; stop leak if you can do so without risk. Use water spray to reduce vapors; do not get water inside container.
Small spills: flush area with flooding amounts of water.
Large spills: dike far ahead of spill for later disposal (*DOT 1984).
If leak or spill has not ignited, use water spray to disperse vapors (*NFPA 1978).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
CPE	POOR/LIMITED
Neoprene	GOOD/LIMITED*
Nitrile	POOR/LIMITED*
PE	POOR/MANY
PVC	POOR/LIMITED*
Saranex	POOR/LIMITED
Teflon	POOR/LIMITED
Viton	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Acrylonitrile reaction causes redness, blisters and some systemic signs (*Gosselin 1976). Symptoms derive from tissue anoxia in order of onset: limb weakness, dyspnea (difficult breathing), burning sensation in throat, dizziness, impaired judgment, cyanosis (turning blue), nausea, collapse, irregular breathing, convulsions and death. In later stages collapse, irregular breathing or convulsions and cardiac arrest may occur without warning. Some patients appear hysterical or may even be violent (*Encyc Occupat Health and Safety 1983).

Emergency and First Aid Procedures: Get emergency medical treatment immediately. If victim has taken the substance by ingestion (orally) and is not showing symptoms, give syrup of ipecac with salt solution or water. If there is exposure through skin contact, wash twice with soap and water. Exposed eyes should be flushed copiously with water for at least 15 minutes. If the victim stops breathing before emergency medical treatment

ACRYLONITRILE

is available, give artificial respiration or oxygen but avoid mouth to mouth resuscitation; also avoid contact with contaminated skin (Gosselin 1984, p. III-127; *Rumack 1985).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHYLENEDIAMINE

CAS Registry Number: 107-15-3

Synonyms: 1,2-Diaminoethane; 1,2-Ethanediamine; 1,2-Ethylenediamine; beta-Aminoethylamine; Dimethylenediamine; Ethylendiamine

Chemical Formula: $C_2H_8N_2$

Molecular Weight: 60.12

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.3 mg/liter (*NIOSH/RTECS 1985)

TPQ: 10,000 (pounds)

RQ: 5,000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 241°F, 116°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.898 at 25°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 10.7 at 20°C (*Hawley 1981)

Melting Point: 46°F, 8°C (*Merck 1983)

Vapor Density (AIR=1): 2.07 (*Sax 1975)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble in water (*Weast 1979)

Appearance and Odor: Colorless, thick liquid (*Sax 1975); ammonia-like odor (*Encyc Occupat Health and Safety 1983)

ETHYLENEDIAMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 10 ppm (25 mg/m^3) (*NIOSH/OSHA 1978)

ACGIH TLV: TWA 10 ppm (25 mg/m^3) (*ACGIH 1983)

IDLH: 2000 ppm (*NIOSH/OSHA 1978)

Other Limits Recommended: Maximum allowable concentration (USSR): 2 mg/m^3 (Encyc Occupat Health and Safety 1983, p. 141)

Routes of Entry: **Inhalation:** Yes (*Arena 1979)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Vapor inhalations at a concentration of 200 ppm for 5 to 10 minutes will lead to nasal irritation and produce a tingling sensation. Inhalation at concentrations of 400 ppm or greater leads to severe nasal irritation (*Clayton and Clayton 1981-82). Respiratory irritation may result (Gosselin 1984, p. II-206). Many individuals are hypersensitive to ethylenediamine exposure; therefore, safe threshold limits are difficult to set (*ACGIH 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 93°F, 34°C (CC); 150°F, 66°C (OC) (*NFPA 1978)
Flammable Limits:
LEL: 4.2% (*NFPA 1978)
UEL: 14.4% (*NFPA 1978)

Extinguishing Methods: Use water spray, dry chemical, alcohol foam, or carbon dioxide (*NFPA 1978).

Special Fire Fighting Procedures: Wear full protective clothing including gloves and boots. If necessary to enter closed area, wear full-faced gas masks with self-contained breathing apparatus. Do not use water in case of drum or tank fires (*CHRIS 1978). If a leak or spill has not ignited, use water spray to reduce the vapors and dilute spills to nonflammable mixtures. Use water to keep fire-exposed containers cool (*NFPA 1978).

Unusual Fire and Explosion Hazards: Burning rate: 2.2 mm/minute (*CHRIS 1978). When exposed to heat or flame, the material has a moderate fire potential. The material can react readily with oxidizing materials (*Sax 1975). Containers may explode in heat of fire (*DOT 1984).

NFPA Flammability Rating: 2

ETHYLENEDIAMINE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Carbon disulfide (*NRC 1981); silver perchlorate (*NFPA 1978); imines (*Leleu MJ. 1979. CAH Notes Doc. 94:127-132); oxidizing materials (*Sax 1975).

Hazardous Decomposition or Byproducts: Material emits nitrogen oxides when burned (*Rumack 1975 to Present).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 430)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

A solvent for casein, albumin, shellac, and sulfur; an emulsifier; stabilizer for rubber latex; inhibitor in antifreeze solutions; pharmaceutic aid (*Merck 1983); intermediate in synthesis of carbamate fungicides and chelating agents (*SRI). An algacide and fungicide (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources. Stop leak if possible without risk. Do not touch spilled material. Use water spray to reduce vapors. Do not get water inside containers. For small spills, absorb with sand or other noncombustible absorbent material and place into containers for later disposal. For large spills, dike far ahead of spill for later disposal. Keep unnecessary people away and isolate area. Stay upwind and keep out of low areas. Isolate area for 1/2 mile in all directions if tank car or truck is involved in fire (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

ETHYLENEDIAMINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
Butyl/Neoprene	POOR/LIMITED*
CPE	POOR/LIMITED
Neoprene	GOOD/LIMITED
PE	POOR/LIMITED
PVC	POOR/MANY
Saranex	GOOD/LIMITED
Teflon	GOOD/LIMITED
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ETHYLENEDIAMINE

(107-15-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless, thick liquid.

Odor - Ammonialike.

Commercial Forms - Liquid shipped in glass bottles; 1- to 5-gallon cans; 55-gallon, tin-lined drums; and tank cars.

Uses - Solvent, emulsifier, stabilizer, chemical intermediate, component of antifreeze solutions, herbicide.

Materials to Avoid - Oxidizers.

Caution: *Flammable liquid. Avoid sources of ignition including sparks or fire. When burned, ethylenediamine will emit toxic nitrogen oxides.*

Other Names - 1,2-Diaminoethane, 1,2-ethanediamine.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, water, milk, normal saline, D5W, Ringer's lactate, decadron.

Signs and Symptoms of Acute Ethylenediamine Exposure:

Acute exposure to ethylenediamine may result in cough, difficulty in breathing, irritation of the lungs, and pneumonia. Nausea, vomiting, and diarrhea are often seen. Contact with ethylenediamine may result in redness, pain, irritation, and burns.

ETHYLENEDIAMINE

Emergency Life-Support Procedures:

Acute exposure to ethylenediamine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to ethylenediamine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to ethylenediamine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Thoroughly wash exposed skin areas with water for at least 15 minutes.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

ETHYLENEDIAMINE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FORMALDEHYDE CYANOHYDRIN

CAS Registry Number: 107-16-4

Synonyms: Acetonitrile, Hydroxy-; 2-Hydroxyacetonitrile; alpha-Hydroxyacetonitrile; alpha-Hydroxymethylcyanide; Cyanomethanol; Glycolic Nitrile; Glyconitrile; Hydroxyacetonitrile; Hydroxymethylnitrile; Methylene Cyanohydrin; USAF A-8565

Chemical Formula: C_2H_3NO

Molecular Weight: 57.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (rabbit) 5.0 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 361°F, 183°C, with slight decomposition (*Weast 1979)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 1 at 63°C (*Patty 1963)

Melting Point: Less than -98°F, less than -72°C (*Weast 1979)

Vapor Density (AIR=1): 1.96 (*Patty 1963)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Patty 1963)

Appearance and Odor: Colorless oil (*Sax 1979); odorless (*Encyc Occupat Health and Safety 1971); sweetish taste (*Patty 1963)

FORMALDEHYDE CYANOHYDRIN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Recommended NIOSH standard air ceiling concentration is 5 mg/m^3/15 minutes (*NIOSH/RTECS 1985).

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Hawley 1977)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic (*Patty 1963); exposure by any route should be avoided; may have fatal consequences; death from asphyxiation may occur similar to that resulting from hydrogen cyanide (*Encyc Occupat Health and Safety 1971).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Acetonitrile) Do not extinguish fire if material is leaking and flow cannot be stopped. Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, pp. 3-4).

Special Fire Fighting Procedures: (Non-Specific -- Acetonitrile) Cool containers with flooding quantities of water. Apply water from as far away as possible. Avoid breathing vapors. Keep upwind. Wear self-contained breathing apparatus. Avoid bodily contact with the material. Wear boots, protective gloves, and goggles (Student 1981, pp. 3-4).

Unusual Fire and Explosion Hazards: Moderate explosion hazard when exposed to heat or by spontaneous chemical reaction in the presence of alkalies if uninhibited (*Sax 1979). When heated to decomposition, it emits toxic fumes of cyanide and nitrogen oxides (Sax 1984, p. 1556).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Bretherick 1979)
Stable:

Conditions to Avoid: May explode on standing (*Bretherick 1979).

FORMALDEHYDE CYANOHYDRIN

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic cyanide and nitrogen oxide fumes (Sax 1984, p. 1556)

Hazardous Polymerization: May Occur: Yes (*Sax 1979)
May Not Occur:

Conditions to Avoid: Presence of alkalies, and exposure to heat (*Sax 1979)

SECTION VI -- USE INFORMATION

This material is used in the manufacture of intermediates in pharmaceutical production and as a component of synthetic resins (*Encyc of Occupat Health and Safety 1971), as a chemical intermediate for organic compounds, and as a solvent (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Acetonitrile) Build dikes to contain flow as necessary. Use water spray to disperse vapors and dilute standing pools of liquid. Avoid breathing vapors. Keep upwind. Avoid bodily contact with the material (Student 1981, pp. 3-4).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Similar to cyanide poisoning. Odor of bitter almonds on patient's breath may or may not be present. Vomiting, palpitations, confusion, anxiety, and vertigo may follow exposure. Respiration may initially be rapid, then slow and labored, followed by coma and convulsions (*Rumack 1975 to Present).

FORMALDEHYDE CYANOHYDRIN

SECTION IX (continued)

Emergency and First Aid Procedures: (Non-Specific -- Acetonitrile) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 28).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ALLYL ALCOHOL

CAS Registry Number: 107-18-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 308) AA; Allyl Al; Allylic Alcohol; 2-Propen-1-ol; Vinylcarbinol; Propenyl Alcohol; 1-Propene-3-ol; 3-Hydroxypropene; Orvinylcarbinol; Propenol; Propen-1-ol-3; 2-Vinylcarbinol; 2-Propenyl Alcohol; Shell Unkrautted A; Weed Drench

Chemical Formula: C_3H_6O

Molecular Weight: 58.09

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.39 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 206°F, 97°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.854 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 23.8 at 25°C (*Sunshine 1969)

Melting Point: -200°F, -129°C; freezes at -50°C (Weast 1980, p. C-466)

Vapor Density (AIR=1): 2.0 (*Patty 1963)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Weast 1979)

Appearance and Odor: Mobile, colorless liquid with a pungent mustard odor (*Merck 1976, *Martin 1974). Forms a glass at -190°C (*Worthing 1979).

ALLYL ALCOHOL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 2 ppm (5 mg/m^3) (NIOSH 1987, p. 46)

ACGIH TLV: TWA 2 ppm (5 mg/m^3); STEL 4 ppm (10 mg/m^3) (skin) (ACGIH 1986-87, p. 9)

IDLH: 150 ppm (NIOSH/OSHA 1978, p.44)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 63)
Skin: Yes (Weiss 1980, p. 63)
Ingestion: Yes (Weiss 1980, p. 63)

Health Hazards (Acute, Delayed, and Chronic): Allyl alcohol is an intense irritant to skin, eyes, nose, and throat (Weiss 1980, p. 63). It causes burns on contact, and may cause pulmonary edema if inhaled. It is poisonous in small quantities. The probable oral lethal dose is 50-500 mg/kg, or between 1 teaspoonful and 1 ounce for a 150-lb. person (Gosselin 1984, p. II-98).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 22°C (CC), 32°C (OC) (*Patty 1963)
Flammable Limits:
LEL: 2.5% (*Sunshine 1969)
UEL: 18% (*Sunshine 1969)

Extinguishing Methods: Extinguish with dry chemical, alcohol foam, or carbon dioxide (*NFPA 1978). Dike fire control water for later disposal and do not scatter the material (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Water may be ineffective on fire. Cool exposed containers with water. Wear goggles, self-contained breathing apparatus, rubber overclothing, gloves (Weiss 1980, p. 63). Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Allyl alcohol vapor may explode if ignited in confined areas. Combustion products may be poisonous. The vapor is heavier than air and flashback along vapor trail may occur (Weiss 1980, p. 63). Gives off toxic fumes when heated (*NFPA 1978).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

ALLYL ALCOHOL

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): May react vigorously with oxidizing materials, carbon tetrachloride, acids, oleum, sodium hydroxide, diallyl phosphite, potassium chloride, or tri-n-bromomelamine (Sax 1984, p. 159).

Hazardous Decomposition or Byproducts: Gives off toxic fumes when heated (*NFPA 1978).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Allyl alcohol is used in the production of allyl esters, which are used as monomers and prepolymers in the manufacture of resins and plastics. It is also used in the preparation of pharmaceuticals, organic synthesis of glycerol and acrolein, and as a fungicide and herbicide (*SRI; *Merck 1976; *Browning 1965).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	EXCELLENT/MANY
Butyl/Neoprene	GOOD/LIMITED
CPE	GOOD/LIMITED
Neoprene	EXCELLENT/MANY
PE	GOOD/LIMITED

ALLYL ALCOHOL

SECTION VIII (continued)

PVC	POOR/MANY
Saranex	GOOD/LIMITED
Teflon	GOOD/LIMITED
Viton	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ALLYL ALCOHOL

(107-18-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Pungent, mustardlike.

Commercial Form - Liquid in 1- and 5-gallon cans, drums, tank trucks, tank cars, tank barges.

Uses - Fungicide, herbicide, chemical intermediate for the manufacture of chemicals and chemical warfare agents.

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Allylic alcohol, 3-hydroxypropene, orvinylcarbinol, 2-propen-1-ol, 2-propenyl alcohol, vinylcarbinol, Weed Drench.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, dopamine, levarterenol.

Signs and Symptoms of Acute Allyl Alcohol Exposure:

Warning: *Effects may be delayed. Caution is advised.*

Signs and symptoms of acute exposure to allyl alcohol may be severe and include eye and skin irritation, pain, burns, and ulceration. Lacrimation (tearing), blurred vision, and photophobia (heightened sensitivity to light) are common; permanent eye damage may occur. Nose and throat irritation, headache, cough, dyspnea (shortness of breath), and hemoptysis (spitting up of blood) may be noted. Nausea, vomiting, and hematuria (bloody urine) may also occur. Liver and kidney damage have been reported in study animals.

ALLYL ALCOHOL

Emergency Life-Support Procedures:

Acute exposure to allyl alcohol may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to allyl alcohol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to allyl alcohol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

ALLYL ALCOHOL

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of allyl alcohol is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROMETHYL METHYL ETHER

CAS Registry Number: 107-30-2

Synonyms: Chlorodimethyl Ether; Chloromethoxymethane; CMME; Dimethylchloroether; Ether, Chloromethyl Methyl; Ether Dimethyl Chloro; Methane, Chloromethoxy-; Methoxychloromethane; Methoxymethyl Chloride; Methylchloromethyl Ether; Methylchloromethyl Ether, Anhydrous; Monochlorodimethyl Ether; Monochloromethyl Methyl Ether

Chemical Formula: C_2H_5ClO

Molecular Weight: 80.52

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.182 mg/liter/7 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 138°F, 59°C (*IARC 1972-1985)

Specific Gravity (H_2O=1): 1.0605 at 20°/4°C (*IARC 1972-1985)

Vapor Pressure (mmHg): Not Found

Melting Point: -154.3°F, -103.5°C (*Encyc Occupat Health and Safety 1971)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (Weast 1979, p. C-300)

Appearance and Odor: Colorless liquid with an irritating odor (*IARC 1972-1985, *CHRIS 1978)

CHLOROMETHYL METHYL ETHER

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 2 ppm (2 mg/m^3) (ACGIH 1986-87, p. 13)

IDLH: Not Found

Other Limits Recommended: Industrial substance suspect of carcinogenic potential for humans (ACGIH 1984, p. 43).

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): The principal effect is irritation. The liquid causes severe irritation of eyes and skin; and vapor exposure of 100 ppm is severely irritating to eyes and nose. This level is dangerous to life in 4 hours. Pulmonary edema or pneumonia may cause death (*Encyc Occupat Health and Safety 1971). There was increased death rate from respiratory cancer among exposed victims (*IARC 1972-1985) and it is a regulated carcinogen (*Aldrich 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 0°C (OC) (*CHRIS 1978); less than 73.4°F (Sax 1984, p. 738)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemicals, foam, or carbon dioxide. Water may be ineffective in extinguishing fire (*CHRIS 1978).

Special Fire Fighting Procedures: Move container from fire area. Dike fire control water for later disposal; do not scatter material. Cool containers that are exposed to flames with water. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (*DOT 1984).

Unusual Fire and Explosion Hazards: 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 (*DOT 1984). In addition to the risk of explosion, when air mixtures of ether vapors are heated or exposed to flame or sparks, they tend to form peroxides. Ethers containing peroxides can detonate when heated (*Sax 1975). Unburned material may form powerful tear gas. When wet, also forms irritating formaldehyde gas (Weiss 1980, p. 251).

NFPA Flammability Rating: Not Found

CHLOROMETHYL METHYL ETHER

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*CHRIS 1978)

Conditions to Avoid: Decomposing heat (Sax 1984, p. 738)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Evolves formaldehyde and hydrogen chloride (*CHRIS 1978). When heated to decomposition, it emits toxic fumes of chlorides (Sax 1984, p. 738).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 251)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Intermediate in synthesis of chloromethylated compounds (*IARC 1972-1985); a nion-exchange resins; dodecylbenzyl chloride; and chloromethylating reaction mixtures (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources; no flares, smoking, or flames. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Absorb small spills with sand or other noncombustible absorbent material and place into containers for later disposal. Dike far ahead of large spills for later disposal (*DOT 1984). Flood with water. Rinse with sodium bicarbonate or lime solution (*CHRIS 1978).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Sore throat, fever, chills, difficulty in breathing (*Patty 1963), pulmonary edema with frothy exudate (*Gosselin 1976), and severe skin and eye irritation (*Encyc Occupat Health and Safety 1983) have been reported.

CHLOROMETHYL METHYL ETHER

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SARIN

CAS Registry Number: 107-44-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 122) Phosphonofluoridic Acid, Methyl-, Isopropyl Ester; GB; IMPF; Isopropoxymethylphosphoryl Fluoride; Isopropyl Methanefluorophosphonate; Isopropyl Methylfluorophosphate; Isopropyl-Methyl-Phosphoryl Fluoride; Methylphosphonofluoridic Acid Isopropyl Ester; MFI; Phosphine Oxide, Fluoroisopropoxymethyl; Phosphoric Acid, Methylfluoro-, Isopropyl Ester; Sarin II; T-144; T-2106; TL 1618; Trilone 46

Chemical Formula: $C_4H_{10}FO_2P$

Molecular Weight: 140.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (human) 0.07 mg/liter (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 297°F, 147°C (Merck 1983, p. 1204)

Specific Gravity (H_2O=1): 1.10 at 20°C/4°C (Merck 1983, p. 1204)

Vapor Pressure (mmHg): 2.9 at 25°C (U.S. Army 1975, p. 3-4)

Melting Point: -71°F, -57°C (Merck 1983, p. 1204)

Vapor Density (AIR=1): 4.86 (U.S. Army 1975, p. 3-4)

Evaporation Rate (Butyl acetate=1): About the same as water (U.S. Army 1975, p. 3-4)

SARIN

SECTION II (continued)

Solubility in Water: Miscible with and hydrolyzed by water (Merck 1983, p. 1204)

Appearance and Odor: Liquid (Merck 1983, p. 1204). A colorless liquid and vapor. Almost no odor in pure state (U.S. Army 1975, p. 3-3 to 3-4).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (U.S. Army 1975, p. 3-4)
Skin: Yes (U.S. Army 1975, p. 3-4)
Ingestion: Yes (U.S. Army 1975, p. 3-4)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic; lethal dose in humans may be as low as 0.01 mg/kg. Extremely active cholinesterase inhibitor. Toxic effects similar to, but more severe than those of parathion (Merck 1983, p. 1204). Death within 15 minutes after fatal dose is absorbed (U.S. Army 1975, p. 3-4).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Non-flammable (U.S. Army 1975, p. 3-4)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with foam, carbon dioxide, and dry chemical (Sax 1984, p. 1662)

Special Fire Fighting Procedures: Protective clothing and respiratory protection (U.S. Army 1975, p. 3-5).

Unusual Fire and Explosion Hazards: Non-flammable (U.S. Army 1975, p. 3-5)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (U.S. Army 1975, p. 3-4)

SARIN

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Slightly corrosive to steel (U.S. Army 1975, p. 3-4). Hydrolyzed by water (Merck 1983, p. 1204).

Hazardous Decomposition or Byproducts: Acidic conditions produce hydrogen fluoride; alkaline conditions produce isopropyl alcohol and polymers (U.S. Army 1975, p. 3-4). When heated to decomposition or reacted with steam, it emits very toxic fumes of fluorides and oxides of phosphorus (Sax 1984, p. 1662).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Quick-acting military chemical nerve agent (U.S. Army, p. 3-4). Chemical warfare agent (Merck 1983, p. 1204).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Rapidly hydrolyzed by dilute aqueous sodium hydroxide or sodium carbonate forming relatively non-toxic products. Water alone removes the fluorine atom producing a non-toxic acid (Merck 1983, p. 1204). Decontaminants include bleach slurry, dilute alkali, hot soapy water, steam and ammonia (U.S. Army 1975, p. 3-4).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SARIN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include difficulty in breathing, drooling, excessive sweating, nausea, vomiting, cramps, involuntary defecation and urination, twitching, jerking, staggering, headache, confusion, drowsiness, coma, convulsion, dimness of vision, and pinpoint pupils (U.S. Army 1975, p. 3-3).

Emergency and First Aid Prooedures: Immediate decontamination of the smallest drop is essential. Vapor penetrates the skin (U.S. Army 1975, p. 3-4). Toxic effects are similar to parathion (Sax 1984, p. 1662). Treatment for parathion is as follows: move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TEPP

CAS Registry Number: 107-49-3

Synonyms: Pyrophosphoric Acid, Tetraethyl Ester (Dry Mixture); Bis-O,O-Diethylphosphoric Anhydride; Bladan; Diphosphoric Acid, Tetraethyl Ester; ENT 18,771; Ethyl Pyrophosphate [ET4P207]; Ethyl Pyrophosphate, Tetra-; Fosvex; Grisol; Hept; Hesamite; Hexamite; Killax; Kilmite 40; Lethalaire G-52; Lirohex; Mortopal; Nifos; Nifos T; Nifost; TEP; Terrasytam; Tetraethyl Diphosphate; Tetraethylpyrophosphate; Tetrastigmine; Tetron; Tetron-100; Vapotone; Vaptone

Chemical Formula: $C_8H_{20}O_7P_2$

Molecular Weight: 290.22

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 0.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 280°F, 138°C at 2.3 mm (*Merck 1983)

Specific Gravity (H_2O=1): 1.185 at 20°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 0.00047 at 30°C (*Merck 1976)

Melting Point: 32°F, 0°C (NIOSH/OSHA 1978, p. 174)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble (*Weast 1979); quickly hydrolyzed (Merck 1983, p. 1317)

TEPP

SECTION II (continued)

Appearance and Odor: Colorless liquid (*Spencer 1982); faint fruity odor (*CHRIS 1978). Technical product is a dark amber-colored liquid (*Worthing 1979).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.05 mg/m^3 (NIOSH/OSHA 1978, p. 174)

ACGIH TLV: TWA 0.004 ppm (0.05 mg/m^3) (ACGIH 1986-87, p. 30)

IDLH: 10 mg/m^3 (NIOSH/OSHA 1978, p. 174)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 175)
Skin: Yes (NIOSH/OSHA 1978, p. 175)
Ingestion: Yes (NIOSH/OSHA 1978, p. 175)

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. Probable oral lethal dose in humans is less than 5 mg/kg (a taste) for a 150 lb. person (*Gosselin 1976). A small drop in the eye may cause death (*Clarke 1981). Small doses at frequent intervals are additive (*Sax 1979). Poisonings always develop at a rapid rate (*Gosselin 1976). It is a cholinesterase inhibitor (*Merck 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not combustible (NIOSH/OSHA 1978, p. 174)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and full protective clothing. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (*DOT 1984).

Unusual Fire and Explosion Hazards: Extremely toxic fumes of unburned material and phosphoric acid (*CHRIS 1978).

NFPA Flammability Rating: Not Found

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

TEPP

SECTION V -- REACTIVITY DATA

Incompatibility (Materials to Avoid): Incompatible with strong oxidizers (NIOSH/OSHA 1978, p. 174).

Hazardous Decomposition or Byproducts: Highly toxic gases and vapors of unburned material and phosphoric acid are formed in fires (*CHRIS 1978).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an insecticide and a rodenticide (*SRI; *Hawley 1981). No rodenticide use registered in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

In case of spills, stay upwind; stay out of low areas. Use water spray to reduce vapors, but do not put water on spill area. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if possible. Take up spills with noncombustible absorbent material. For large spills dike far ahead (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

TEPP

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms are similar to those for parathion, including nausea, vomiting, abdominal cramps, excessive salivation, headache, giddiness, vertigo, weakness, runny nose, sensation of tightness in the chest, blurring or dimness of vision, weakness and twitching of muscles, confusion, difficulty in breathing, convulsions, and coma (*Gosselin 1976).

Emergency and First Aid Procedures: Move victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If contact with material occurs, flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing. Keep victim quiet and maintain normal body temperature. Effects may be delayed. Keep victim under observation (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- VINYL ACETATE MONOMER

CAS Registry Number: 108-05-4

Synonyms: 1-Acetoxyethylene; Acetic Acid Ethenyl Ester; Acetic Acid Vinyl Ester; Acetic Acid, Ethenyl Ester; Ethenyl Acetate; VAC; Vinyl A Monomer; Vinyl Acetate HQ; Vyac; Zeset T

Chemical Formula: $C_4H_6O_2$

Molecular Weight: 86.09

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000 (pounds)

RQ: 5,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 162-163°F, 72-73°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.932 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 83 at 20°C; 140 at 30°C (*Verschueren 1983)

Melting Point: -136°F, -93.2°C (*Weast 1979)

Vapor Density (AIR=1): 3.0 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g/50 mL at 20°C (*Merck 1983)

VINYL ACETATE MONOMER

SECTION II (continued)

Appearance and Odor: Colorless to white mobile liquid (unstable) or blue-green (stable) (*Sax 1975; *Weast 1979). Sweet, pleasant, fruity characteristic odor in small quantities (*CHRIS 1978) or a sour, sharp smell (*Verschueren 1983).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 10 ppm (30 mg/m^3); STEL 20 ppm (60 mg/m^3) (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: NIOSH recommended air ceiling concentration: 15 mg/m^3 for 15 minutes (*NIOSH 1977-Present). Maximum Air Concentration (USSR): 10 mg/m^3 (Encyc Occupat Health and Safety 1983, p. 2260).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (Sax 1984, p. 85)
Ingestion: Yes (*Lefaux 1968)

Health Hazards (Acute, Delayed, and Chronic): Vinyl acetate has been related to reproductive abnormalities (*Talakina 1977). It is a skin and upper respiratory tract irritant (*ACGIH 1980) and a central nervous system depressant (*Rumack 1975 to Present). Exposure caused gradual deterioration of heart muscles (*Agaronyon 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 18°F, -8°C (CC) (*NFPA 1978); 0.5-0.9°C (TOC) (*Kirk-Othmer 1978)
Flammable Limits:
LEL: 2.6% (*Encyc Occupat Health and Safety 1983)
UEL: 13.4% (*Encyc Occupat Health and Safety 1983)

Extinguishing Methods: Small fires: extinguish with dry chemical, carbon dioxide, water spray, fog, or alcohol foam. Large fires: water spray, fog, or alcohol foam (*DOT 1984).

Special Fire Fighting Procedures: Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Spray cooling water on containers that are exposed to flames until well after the fire is out. 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. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 26).

VINYL ACETATE MONOMER

SECTION IV (continued)

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits acrid fumes (*Sax 1975). Highly dangerous when exposed to heat, flames or oxidizers; explosion hazard with strong acids and strong oxidizers (Sax 1984, p. 85).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Merck 1976)

Conditions to Avoid: Avoid light or any polymerizing initiator (*Merck 1976, *Bretherick 1979).

Incompatibility (Materials to Avoid): Incompatible with alumina (*Bretherick 1979); oxidizing materials (*Sax 1975); 2-aminoethanol, chlorosulfonic acid; ethyleneimine; 36% hydrochloric acid; 48.7% hydrofluoric acid; 70% nitric acid; oleum; 96% sulfuric acid; ethylene diamine; peroxides (*NFPA 1978); and silica gel (*Bretherick 1979).

Hazardous Decomposition or Byproducts: When heated to decomposition, it burns and emits acrid fumes (*Sax 1975).

Hazardous Polymerization: **May Occur:** Yes (*Kirk-Othmer 1978)
May Not Occur:

Conditions to Avoid: Polymerization can be initiated by organic and inorganic peroxides; azo compounds; redox systems (including organometallic components); light; and high energy radiation (*Kirk-Othmer 1978).

SECTION VI -- USE INFORMATION

Monomer for making poly (vinyl acetate) and vinyl acetate copolymers, which are used in water based paints, adhesives, paper coatings, or nonwoven binders and applications not requiring service at extreme temperatures (*Kirk-Othmer 1978). In polymerized form it is used for plastic masses, films, and lacquers (*Merck 1983). It is also used in the production of emulsion paint ingredients, finishing and impregnation materials and glue (*Encyc Occupat Health and Safety 1983).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid all skin and eye contact and inhalation (see Section III above). Keep unnecessary people away and stay upwind. For spill or leaks shut off ignition sources; no flares, smoking or flames in hazard area. Use water spray to reduce vapors. Absorb spills with noncombustible absorbent material (DOT 1984, Guide 26).

VINYL ACETATE MONOMER

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
CPE	GOOD/LIMITED*
PVC	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for VINYL ACETATE MONOMER

(108-05-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to white liquid.

Odor - Sweet, pleasant.

Commercial Form - Liquid in 1- to 5-gallon cans, 55-gallon steel drums, tank trucks, and tank barges.

Uses - Manufacture of vinyl acetate, plastic, adhesives, paper coatings, nonwoven binders, films, lacquers, water-based paints, glue, cosmetics, and safety glass; chewing gum base; fumigant.

Materials to Avoid - Acids, alkali, oxidizers.

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including fire or sparks.*

Other Names - Acetic acid, vinyl ester; ethenyl acetate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, morphine.

Signs and Symptoms of Acute Vinyl Acetate Monomer Exposure:

Vinyl acetate monomer may irritate the skin, eyes, and respiratory tract; blisters may form. Inhalation of vapors may result in dizziness or suffocation.

VINYL ACETATE MONOMER

Emergency Life-Support Procedures:

Acute exposure to vinyl acetate monomer may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to vinyl acetate monomer.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to vinyl acetate monomer.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

VINYL ACETATE MONOMER

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of vinyl acetate monomer is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOPROPYL CHLOROFORMATE

CAS Registry Number: 108-23-6

Synonyms: Carbonochloride Acid, 1-Methylethyl Ester; Carbonochloridic Acid, 1-Methylethyl Ester; Chloroformic Acid Isopropyl Ester; Formic Acid, Chloro-, Isopropyl Ester; Isopropyl Chlorocarbonate; Isopropyl Chloromethanoate

Chemical Formula: $C_4H_7ClO_2$

Molecular Weight: 122.55

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} inhalation (mouse) 1.5 mg/liter/hour (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 220°F, 104.6°C at 761 mmHg (*Weast 1979)

Specific Gravity (H_2O=1): 1.08 (*Patty 1963)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): 4.2 (*Patty 1963)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble in water (*Weast 1979)

Appearance and Odor: Colorless liquid (*Hawley 1977)

ISOPROPYL CHLOROFORMATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1657)
Skin: Yes (Sax 1984, p. 1657)
Ingestion: Yes (Sax 1979, p. 1657)

Health Hazards (Acute, Delayed, and Chronic): Acute: highly toxic by inhalation, ingestion and skin absorption (Sax 1984, p. 1657). Delayed: can produce delayed pulmonary edema (2-24 hours after exposure) similar to that produced by phosgene (*Patty 1963; *Rumack 1975 to Present). Inhalation of material may cause death or permanent injury (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 60.1°F, 15.6°C (*Clayton and Clayton 1981-1982)
Flammable Limits: Flammable; may be ignited by heat, sparks or flame (DOT 1984, Guide 29)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Keep unnecessary people away and isolate hazard area. Stay upwind and keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. For small fires, use dry chemical, carbon dioxide, water spray or foam. For large fires, use water spray, fog or foam. Do not get water inside container. Cool containers exposed to flame with water until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: Extremely dangerous; this chemical has exploded while stored in refrigerator (*Sax 1979). Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 29).

NFPA Flammability Rating: Not Found

ISOPROPYL CHLOROFORMATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Patty 1963)
Stable:

Conditions to Avoid: Avoid phosgene (*Sax 1979)

Incompatibility (Materials to Avoid): Reacts violently with phosgene (*Sax 1979).

Hazardous Decomposition or Byproducts: Like other chlorides (Sax 1984, p. 1657) when heated to decomposition or on contact with acids or acrid fumes, they evolve highly toxic chloride fumes (Sax 1984, p. 672).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a chemical intermediate for free-radical polymerization initiators and in organic synthesis (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

In case of spills or leaks, shut off ignition sources and keep away flares, smoke or flames. Do not touch spilled material. Use water to reduce vapors but do not get water inside containers. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Eye irritation, irritation of upper respiratory tract and surface burns have been observed. Eye irritation may persist after exposure ceases, and skin sensitization may occur (*Patty 1963). Inhalation exposures at elevated concentrations cause death by immediate lung damage, lower concentrations cause difficult breathing, collapse, and convulsions (Clayton and Clayton 1981-1982, p. 2390).

ISOPROPYL CHLOROFORMATE

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air. Obtain emergency medical care immediately. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 29).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CYCLOHEXYLAMINE

CAS Registry Number: 108-91-8

Synonyms: Aminocyclohexane; Aminohexahydrobenzene; Benzenamine, Hexahydro-; CHA; Cyclohexanamine; Hexahydroaniline; Hexahydrobenzenamine

Chemical Formula: $C_6H_{13}N$

Molecular Weight: 99.17

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 274.1°F, 134.5°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.8647 at 25°C/25°C (*Merck 1983)

Vapor Pressure (mmHg): Not Found

Melting Point: 0.1°F, -17.7°C (*Merck 1983)

Vapor Density (AIR=1): 3.42 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Merck 1983)

Appearance and Odor: A colorless to yellow liquid with a strong, fishy, amine odor (*NFPA 1978; *Merck 1983).

CYCLOHEXYLAMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 10 ppm (40 mg/m^3) (ACGIH 1986-87, p. 15)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 298)
Skin: Yes (Hawley 1981, p. 298)
Ingestion: Yes (Hawley 1981, p. 298)

Health Hazards (Acute, Delayed, and Chronic): This is classified as very toxic -- probable oral lethal dose is 50-500 mg/kg or between 1 teaspoon and 1 ounce for a 70 kg (150 lb.) person (*Gosselin 1976). It is considered a nerve poison (*LeFaux 1968). This is a weak methemoglobin-forming substance (*ACGIH 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 88°F, 31°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use dry chemical, alcohol foam or carbon dioxide; water may be ineffective (*NFPA 1978).

Special Fire Fighting Procedures: Move container from fire area if you can do it without risk. Stay away from ends of tanks. Cool containers that are exposed to flames with water from the side until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate for one-half mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 68).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits highly toxic fumes (Sax 1984, p. 834). Vapor may travel a considerable distance to source of ignition and flash back (*NFPA 1978). Toxic oxides of nitrogen are produced during combustion (Student 1984, p. 162).

NFPA Flammability Rating: 3

CYCLOHEXYLAMINE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Physical damage, storage with oxidizing material (*NFPA 1978).

Incompatibility (Materials to Avoid): Nitric acid; reacts vigorously with oxiding materials (Sax 1984, p. 834).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes (*Sax 1975).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in organic synthesis, manufacturing of pesticides, plasticizers, emulsifying agents, dry-cleaning soaps, acid gas absorbents (*Merck 1983); corrosion inhibitor in boiler water and oil fields; chemical intermediate for rubber-processing chemicals, dyes, cyclamate artificial sweeteners (non-U.S. use) and for herbicide; processing agent for nylon fiber production (*SRI). Not registered as a pesticide in the U.S. (USEPA/ Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 68).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CYCLOHEXYLAMINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Neoprene	POOR/LIMITED
Nitrile	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Light-headedness, drowsiness, anxiety, apprehension, nausea, slurred speech, vomiting, pupillary dilation, severe skin irritation (*ACGIH 1980; *Clayton and Clayton 1981-82).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 68).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENOL

CAS Registry Number: 108-95-2

Synonyms: Benzenol; Carbolic Acid; Hydroxybenzene; Izal; Monohydroxybenzene; Monophenol; NCI-C50124; Oxybenzene; Phenic Acid; Phenyl Alcohol; Phenyl Hydrate; Phenyl Hydroxide; Phenylic Acid; Phenylic Alcohol

Chemical Formula: C_6H_6O

Molecular Weight: 94.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mammal) 0.074 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 359.1°F, 181.75°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.0722 at 20/4°C (*Weast 1979)

Vapor Pressure (mmHg): 0.3513 at 25°C (*Sunshine 1969)

Melting Point: 109°F, 43°C (*Merck 1976)

Vapor Density (AIR=1): 3.24 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 93 g/liter at 25°C (*Morrison 1973)

Appearance and Odor: Colorless crystals or white crystalline mass (*Merck 1976), with aromatic, somewhat sickening sweet and acrid odor (*Clayton and Clayton 1981-82). It is liquefied by mixing with about 8% water (Merck 1983, p. 1043).

PHENOL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 ppm (19 mg/m^3) (NIOSH 1987, p. 188)

ACGIH TLV: TWA 5 ppm (19 mg/m^3); STEL 10 ppm (38 mg/m^3) (to be changed) (ACGIH 1986-87, p. 26)

IDLH: 250 ppm (NIOSH 1987, p. 188)

Other Limits Recommended: NIOSH: 20 mg/m^3 (5.2 ppm) 10-hour TWA, ceiling 60 mg/m^3 (15.6 ppm)/15 minutes (NIOSH 1987, p.188)

Routes of Entry: **Inhalation:** Yes (*Encyc Occupat Health and Safety 1971)
Skin: Yes (*NFPA 1978)
Ingestion: Yes (*NFPA 1978)

Health Hazards (Acute, Delayed, and Chronic): Toxic hazard rating is very toxic: probable oral lethal dose (human) is 50-500 mg/kg (*Gosselin 1976). Ingestion of 1 gram has been lethal to humans (*Encyc Occupat Health and Safety 1971). Lethal amounts may be absorbed through skin or inhaled (*NFPA 1978). Industrial contact can cause chronic poisoning with kidney and liver damage (*Merck 1976).

Medical Conditions Generally Aggravated by Exposure: Persons affected with hepatic or kidney diseases are at a greater risk (*Clayton and Clayton 1981-82).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 79°C (CC) (*Sunshine 1969)
Flammable Limits:
LEL: 1.7% (*CHRIS 1978)
UEL: 8.6% (*CHRIS 1978)

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray or foam (alcohol); large fires: water spray, fog or foam; use water spray to cool containers in fire area (*Environment Canada 1981).

Special Fire Fighting Procedures: Move container from fire area if it can be done without risk; fight fire from maximum distance; dike fire control water for later disposal, do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Flammable vapors when heated (*NFPA 1978). Runoff from fire control water may give off poisonous gases and cause pollution (*DOT 1984). Mixtures of 9-10% phenol in air are explosive (*Clayton and Clayton 1981-82).

NFPA Flammability Rating: 2

PHENOL

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Decomposes slowly on air contact (*Merck 1976). Avoid contact with strong oxidizing agents (*CHRIS 1978).

Incompatibility (Materials to Avoid): Aluminum chloride/nitrobenzene mixture, peroxodisulfuric acid, peroxomonosulfuric acid (*Bretherick 1979), and strong oxidizing agents (*CHRIS 1978).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Disinfectant, antiseptic, bactericide (*Merck 1976). Chemical intermediate for phenolic resins, medicinals, and many other chemicals; solvent for petroleum refining (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Spills must be disposed of immediately by properly protected personnel; no others should remain in area. Flush with flooding quantities of water, then use caustic soda solution for neutralization (*NFPA 1978). Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED*
CPE	POOR/LIMITED
Neoprene	POOR/LIMITED
Nitrile	POOR/MANY
PE	GOOD/LIMITED
PVC	POOR/MANY

PHENOL

SECTION VIII (continued)

Teflon	GOOD/LIMITED
Viton	POOR/LIMITED*

*Based on qualitative performance information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHENOL

(108-95-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless or white to pink crystalline mass.

Odor - Sickeningly sweet, acrid.

Commercial Forms - Liquid mixed with other components (mostly cresols), or fused crystals in 25- and 55-gallon drums, tank cars, or tank trucks.

Uses - Chemical intermediate, analytical reagent, petroleum solvent, disinfectant, antiseptic, preservative.

Materials to Avoid - Strong oxidizers.

Other Names - Carbolic acid, hydroxybenzene, Izal, phenic acid, phenyl alcohol, phenyl hydroxide, phenylic acid, phenylic alcohol.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, polyethylene glycol 300 or 400, water, milk, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, D5W, normal saline, Ringer's lactate, castor oil, diazepam, phenytoin, phenobarbital, 1% methylene blue.

Signs and Symptoms of Acute Phenol Exposure:

Signs and symptoms of acute exposure to phenol may be severe, and range from tachycardia (rapid heart rate) and tachypnea (rapid respiratory rate) to hypotension (low blood pressure), weak pulse, cardiac failure, pulmonary edema, and respiratory arrest. Cardiac arrhythmias may be noted.

Weakness, headache, dizziness, tinnitus (ringing in the ears), delirium, and shock are common. Seizures may often be followed by coma. Pallor, profuse sweating, dilated pupils, and a profound drop in body temperature may occur. Gastrointestinal effects may include nausea, abdominal pain, bloody vomitus, and bloody diarrhea. Renal insufficiency may lead to hematuria (bloody urine). Liver damage may also occur.

PHENOL

Phenol is corrosive to the skin and mucous membranes. Contact may result in severe and painful burns, which promptly become anesthetized (numb) to touch and pain. Ulceration may follow.

Emergency Life-Support Procedures:

Acute exposure to phenol may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phenol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phenol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Remove phenol from skin with undiluted polyethylene glycol 300 or 400, if available. If not available, use water. Follow polyethylene glycol wash with a water wash.

6. Wash exposed skin areas for at least 15 minutes with large amounts of water.

PHENOL

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

8. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Immediately give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. If a dilute (5% or less) solution has been ingested, vomiting may be induced with syrup of Ipecac. DO NOT induce vomiting if concentration is greater than 5% or unknown. If elapsed time since ingestion of phenol is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of phenol may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THIOPHENOL

CAS Registry Number: 108-98-5

Synonyms: Benzene, Mercapto-; Benzenethiol; Mercaptobenzene; Phenol, Thio-; Phenyl Mercaptan; Phenylthiol

Chemical Formula: C_6H_6S

Molecular Weight: 110.17

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.126 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 334.9°F, 168.3°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.0728 at 25°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 1 at 18.6°C (Weast 1979, p. D-208)

Melting Point: 5.4°F, -14.8°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble in water (*Merck 1976)

Appearance and Odor: Water-white liquid (*Hawley 1977); repulsive, penetrating, garlic-like odor especially when impure (*Merck 1976).

THIOPHENOL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.5 ppm, 2 mg/m^3 (*ACGIH 1981)

IDLH: Not Found

Other Limits Recommended: Occupational exposure to benzenethiol recommended standard: air ceiling concentration 0.5 mg/m^3/15 minutes (*NIOSH/RTECS 1985).

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 368)
Skin: Yes (Sax 1984, p. 368)
Ingestion: Yes (Sax 1984, p. 368)

Health Hazards (Acute, Delayed, and Chronic): Marked potential for causing eye changes (*Encyc Occupat Health and Safety 1983). May cause death (DASE 1980, p. 189)

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 57).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 57).

Unusual Fire and Explosion Hazards: When heated to decomposition or on contact with acids, it emits toxic fumes of sulfur oxides (Sax 1984, p. 368). May be ignited by heat, sparks or flames. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers (DOT 1984, Guide 57).

NFPA Flammability Rating: Not Found

THIOPHENOL

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes. Oxidizes in air (*Merck 1976).
Stable:

Conditions to Avoid: Contact with acids (Sax 1984, p. 368).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of sulfur oxides (Sax 1984, p. 368).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Pesticide (*Rumack 1975 to Present); intermediate for pesticides, alkyl phenyl sulfides, polymers, and other materials (*SRI); pharmaceutical synthesis (Hawley 1981, p. 1020); mosquito larvicide (Sax 1984, p. 368). Not registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them (DOT 1984, Guide 57).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

THIOPHENOL

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for THIOPHENOL

(108-98-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Water-white liquid.

Odor - Penetrating, garliclike.

Uses - Manufacture of pesticides, pharmaceuticals, polymers, and alkyl phenyl sulfides; mosquito larvicide.

Other Names - Benzenethiol, mercaptobenzene, phenyl mercaptan.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, water, milk, normal saline, D5W, Ringer's lactate, decadron.

Signs and Symptoms of Acute Thiophenol Exposure:

Acute exposure to thiophenol may result in cough, difficulty in breathing, irritation of the lungs, and pneumonia. Nausea, vomiting, and diarrhea are often seen. Contact with thiophenol may result in irritation and redness, pain, inflammation, and severe burns to the skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to thiophenol may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

THIOPHENOL

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to thiophenol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to thiophenol.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. THOROUGHLY wash exposed skin areas with water for at least 15 minutes.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

THIOPHENOL

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROPYL CHLOROFORMATE

CAS Registry Number: 109-61-5

Synonyms: n-Propyl Chloroformate; Carbonochloridic Acid, Propyl Ester; Formic Acid, Chloro-, Propyl Ester; Propyl Chlorocarbonate

Chemical Formula: $C_4H_7ClO_2$

Molecular Weight: 122.56

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (mouse) 10.0 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 237-241°F, 114-116°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.090 at 20 (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): 4.2 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Sax 1984, p. 2307)

Appearance and Odor: Colorless liquid (*Merck 1976)

PROPYL CHLOROFORMATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2307)
Skin: Yes (DOT 1984, Guide 28)
Ingestion: Yes (DOT 1984, Guide 28)

Health Hazards (Acute, Delayed, and Chronic): Strongly irritating to eyes and mucous membranes (*Clayton and Clayton 1981-82). Poisonous; may be fatal if inhaled, swallowed or absorbed through skin (DOT 1984, Guide 28).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -58°F, -50°C (*Clayton and Clayton 1981-82)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray and foam. Move container from fire area if you can do so without risk. Dike fire control water for later disposal; do not scatter the material. Spray cooling water on containers that are exposed to flames until after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of chlorine containing compounds (Sax 1984, p. 2307). Propyl chloroformate is a flammable/combustible material; it may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat or fire. Vapor explosion and poison hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 28).

NFPA Flammability Rating: Not Found

PROPYL CHLOROFORMATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Clayton and Clayton 1981-82)
Stable:

Conditions to Avoid: Decomposes spontaneously to form hydrochloric acid and other products. Avoid moist air (*Clayton and Clayton 1981-82).

Incompatibility (Materials to Avoid): Gradually decomposed by water and alcohol (Merck 1983, p. 1130)

Hazardous Decomposition or Byproducts: Decomposes and forms hydrochloric acid (*Clayton and Clayton 1981-82).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Spill or leak: shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Contact may cause burns to skin and eyes (DOT 1984, Guide 28). Vapors strongly irritating to eyes and mucous membranes (Merck 1983, p. 1130).

PROPYL CHLOROFORMATE

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 28).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MALONONITRILE

CAS Registry Number: 109-77-3

Synonyms: Cyanoacetonitrile; Dicyanomethane; Malonic Acid Dinitrile; Malonic Dinitrile; Malonicdinitrile; Malonodinitrile; Methane, Dicyano-; Methylene Cyanide; Methylenedinitrile; Propanedinitrile; USAF A-4600

Chemical Formula: $C_3H_2N_2$

Molecular Weight: 66.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 19 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 424-426°F, 218-219°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.1910 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: 90°F, 32°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 13 g/100 ml (*Patty 1963)

Appearance and Odor: Material is a colorless to white solid (*Sax 1979, *Patty 1963)

MALONONITRILE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not found

ACGIH TLV: Not found

IDLH: Not found

Other Limits Recommended: Occupational exposure to nitriles recommended standard -- TWA 8 mg/m^3 (*NIOSH/RTECS 1985).

Routes of Entry: **Inhalation:** Yes (*Patty 1963)
Skin: Yes (*Patty 1963)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Metabolized by body to cyanide and thiocyanate; effects of inhalation of toxic fumes will be related to cyanide (*Rumack 1975 to Present, *Patty 1963). Causes brain and heart damage related to lack of cellular oxygen (*Doull 1980). It is classified as extremely toxic. Probable oral lethal dose for humans is 5-50 mg/kg, or between 7 drops and 1 teaspoonful, for a 70 kg (150 lb.) person (Gosselin 1984, p. II-215).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 266°F, 130°C (OC) (*Sax 1979)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Move container from fire area if you can do it without risk. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, malononitrile emits highly toxic fumes (*Sax 1979). May polymerize violently on prolonged heating (*Bretherick 1979).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Heat

MALONONITRILE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Highly toxic fumes (cyanide) when heated (*Sax 1979).

Hazardous Polymerization: **May Occur:** Yes (*Bretherick 1979)
May Not Occur:

Conditions to Avoid: Prolonged heating at 130°C or contact with strong bases at lower temperatures (*Bretherick 1979).

SECTION VI -- USE INFORMATION

It is used in organic synthesis, and as a leaching agent for gold (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid all skin contact, inhalation, and ingestion (see Section III above). Take up small spills with sand or other noncombustible material. Dike far ahead of large spills for later disposal. Do not touch spilled material; stop leak if you can do so without risk. Stay upwind and out of low areas. Isolate area and deny entry (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: See cyanides (*Rumack 1975 to Present). Symptoms of cyanide poisoning include rapid and irregular breathing, anxiety, confusion, odor of bitter almonds (on breath or vomitus), nausea, vomiting (if oral exposure), irregular heart beat, a feeling of tightness in the chest, bright pink coloration of the skin, unconsciousness followed by convulsions, involuntary urination and defecation, paralysis and respiratory arrest (heart will beat after breathing stops) (Gosselin 1984, p. III-126-127).

Emergency and First Aid Procedures: See cyanides. Get emergency medical treatment immediately. If the victim stops breathing before emergency medical treatment is available, give artificial respiration or oxygen, but avoid mouth to mouth respiration; also avoid contact with contaminated

MALONONITRILE

SECTION IX (continued)

skin. If there is exposure through skin contact, wash immediately with soap and water. Exposed eyes should be flushed with copious amounts of water for at least 15 minutes (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FURAN

CAS Registry Number: 110-00-9

Synonyms: 1,4-Epoxy-1,3-Butadiene; Divinylene Oxide; Furfuran; NCI-C56202; Oxacyclopentadiene; Oxole; Tetrole; Axole

Chemical Formula: C_4H_4O

Molecular Weight: 68.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.12 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 90°F, 32°C at 758 mmHg (*Merck 1983)

Specific Gravity (H_2O=1): 0.9371 at 19.4°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: -123°F, -86°C (*Sax 1979)

Vapor Density (AIR=1): 2.3 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Merck 1976); 10 g/liter at 25°C (Verschueren 1983, p. 686)

Appearance and Odor: Clear colorless liquid turning brown upon standing (Hawley 1981, p. 483)

FURAN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Exposure concentration limit: 10 ppm (*Sax 1979).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): The vapors are narcotic (Merck 1983, p. 613). Acute exposure to furan by inhalation may involve both reversible and irreversible changes. Acute exposure by ingestion or skin absorption, as well as chronic exposure, are associated with high toxicity (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Less than 32°F, less than 0°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: 2.3% (*NFPA 1978)
UEL: 14.3% (*NFPA 1978)

Extinguishing Methods: Water may be ineffective (*NFPA 1978). Small fires: dry chemical, carbon dioxide, water spray, or alcohol foam. Large fires: water spray, fog, or alcohol foam (DOT 1984, Guide 26).

Special Fire Fighting Procedures: Move container from fire area if this can be accomplished without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. For massive fires 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. Isolate for 1/2 mile in all directions if a tank car or truck is involved (DOT 1984, Guide 26).

Unusual Fire and Explosion Hazards: Very dangerous, upon exposure to heat or flame. It may form unstable peroxides on exposure to air. Contact with acids can initiate a violent, heat producing reaction (*Sax 1979).

NFPA Flammability Rating: 4

FURAN

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Sax 1979)
Stable:

Conditions to Avoid: Upon standing in air, it may form unstable peroxides (*Sax 1979).

Incompatibility (Materials to Avoid): Acids, oxidizing agents (*Sax 1979).

Hazardous Decomposition or Byproducts: Formation of unstable peroxides upon standing in air (*Sax 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate for tetrahydrofuran (*SRI); formation of lacquers, solvent for resins (*Browning 1965); organic synthesis, especially for pyrrole, thiophene (*Hawley 1981).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Avoid breathing vapors. Keep upwind. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Shut off ignition sources; no flares, smoking, or flames in hazard area. Stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (Student 1984, p. 259; DOT 1984, Guide 26). The exposure concentration limit of 10 ppm together with the low boiling point of furan requires that adequate ventilation be provided in areas handling this chemical. Contact with liquid must be avoided since this chemical can be absorbed through the skin. Thorough washing with soap and water followed by prolonged rinsing should be done immediately after accidental contact (Sax 1984, p. 1462).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

FURAN

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Butyl/Neoprene	POOR/LIMITED*
PVC	POOR/MANY
Viton	POOR/LIMITED
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Vapors are a central nervous system depressant (*Merck 1976). Irritation and burning eyes and skin, dizziness, suffocation (DOT 1984, Guide 26).

Emergency and First Aid Procedures: Move victim to fresh air; if not breathing give artificial respiration or if breathing is difficult give oxygen. In case of contact with the 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 (DOT 1984, Guide 26).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRANS-1,4-DICHLOROBUTENE

CAS Registry Number: 110-57-6

Synonyms: 1,4-Dichloro-trans-2-Butene; 1,4-Dichloro-2-Butene; 1,4-Dichlorobutene; 1,4-Dichlorobutene-2 (trans); 2-Butene, 1,4-Dichloro-, (E)-; 2-Butene, 1,4-Dichloro-, trans-; 2-Butylene Dichloride; Trans-1,4-Dichloro-2-Butene

Chemical Formula: $C_4H_6Cl_2$

Molecular Weight: 125.00

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.44 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 312°F, 155.5°C at 758 mmHg (*Weast 1979)

Specific Gravity (H_2O=1): 1.183 at 25/4°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: 34-37°F, 1-3°C (*Weast 1979)

Vapor Density (AIR=1): 4 (Weiss 1980, p. 322)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble in water (*Weast 1979)

Appearance and Odor: Colorless liquid with a distinct odor (*IARC 1972-85).

TRANS-1,4-DICHLOROBUTENE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*IARC 1972-85)
Skin: Yes (*Grant 1974)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Dichlorobutene) Liquid and vapors from the material are highly corrosive and may damage skin, eyes, lungs, and internal organs (*IARC 1972-85).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: 1.5% (Weiss 1980, p. 330)
UEL: 4% (Weiss 1980, p. 330)

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, spray or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and full protective clothing. Move containers from fire area if you can do so without risk. Spray containers with cooling water until well after fire is out. Isolate for one-half mile in all directions if tank car or truck is involved in a fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: The material will burn, though it may require some effort to ignite (Student 1981, p. 184). Fire produces irritating and poisonous gases (DOT 1984, Guide 29). When heated to decomposition, it emits toxic fumes of chlorine-containing compounds (Sax 1984, p. 583).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 322)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

TRANS-1,4-DICHLOROBUTENE

SECTION V (continued)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorine-containing compounds (Sax 1984, p. 583).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is a chemical intermediate for hexamethylenediamine and chloroprene (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area. Stay upwind; keep out of low areas. Shut off ignition sources. Do not touch spilled material. Use water spray to reduce vapors, but do not get water inside containers. For small spills, absorb with sand or other non-combustible absorbent material. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED**
Butyl/Neoprene	POOR/LIMITED**
CPE	POOR/LIMITED**
Neoprene	POOR/LIMITED**
Nitrile	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

TRANS-1,4-DICHLOROBUTENE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Respiratory distress and burns to skin and eyes (DOT 1984, Guide 29). Inhalation of vapor irritates nose and throat. Contact with eyes causes intense irritation and tears. Contact of liquid with skin causes severe blistering. Ingestion causes severe irritation of mouth and stomach (Weiss 1980, p. 322).

Emergency and First Aid Procedures: Move victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing. In case of contact, immediately flush skin and eyes with running water for 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 29).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PIPERIDINE

CAS Registry Number: 110-89-4

Synonyms: Azacyclohexane; Cyclopentimine; Cypentil; Hexahydropyridine; Hexazane; Pentamethyleneimine; Pentamethylenimine; Pyridine, Hexahydro-

Chemical Formula: $C_5H_{11}N$

Molecular Weight: 85.15

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mammal) 22.4 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 223°F, 106°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.8622 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 40 at 29.2°C (*Patty 1963)

Melting Point: 19°F, -7°C (*Merck 1976), 16°F, -9°C (Weast 1980, p. C-441)

Vapor Density (AIR=1): 3.0 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in all proportions (*Weast 1979)

Appearance and Odor: Piperidine is a clear colorless liquid with an amine-like odor (Sax 1984, p. 2236). A pepper-like odor has also been reported (Hawley 1981, p. 819).

PIPERIDINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Encyc Occupat Health and Safety 1971)
Skin: Yes (*Encyc Occupat Health and Safety 1971)
Ingestion: Yes (*Encyc Occupat Health and Safety 1971)

Health Hazards (Acute, Delayed, and Chronic): Strong local irritant and may cause permanent injury after short exposure to small amounts. Ingestion may involve both irreversible and reversible changes (*Sax 1975). 30 to 60 mg/kg may cause symptoms in humans (Clayton and Clayton 1981, pp. 2689-90).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 61°F (no method given) (*Patty 1963); 37.4°F (no method given) (Sax 1984, p. 2236)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or alcohol foam. Large fires: water spray, fog, or alcohol foam. Move container from fire area if you can do it without risk. Do not get water inside container. Cool containers that are exposed to flames with water from the side until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 29).

Special Fire Fighting Procedures: Keep unnecesary people away; isolate hazard area and deny entry. Stay upwind; keep out of low area. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: Piperidine evolves explosive concentrations of vapor at normal room temperatures (*Encyc Occupat Health and Safety 1971). When heated to decomposition, it emits highly toxic fumes of nitrogen oxides (*Sax 1979). Dangerous, when exposed to heat, flame, or oxidizers (Sax 1984, p. 2236).

NFPA Flammability Rating: 3

PIPERIDINE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: It evolves explosive concentrations of vapor at normal room temperatures (*Encyc Occupat Health and Safety 1971). Keep away from igniting sources and heat (*NFPA 1978).

Incompatibility (Materials to Avoid): Avoid 1-Perchlorylpiperidine (Sax 1984, p. 2236) and oxidizing materials (*Sax 1979). Piperidine is a reactive compound and forms complexes with the salts of heavy metals (Merck 1983, p. 1077).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of nitrogen oxides (Sax 1984, p. 2236).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Solvent and intermediate; curing agent for rubber and epoxy resins; catalyst for condensation reactions; ingredient in oils and fuels; complexing agent (Hawley 1981, p. 818); manufacture of local anesthetics, analgesics, pharmaceuticals, wetting agents, and germicides (*Encyc Occupat Health and Safety 1971); synthetic flavoring (*Fenaroli 1975). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III). Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors; do not get water inside container. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PIPERIDINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED*
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms upon oral administration include weakness, nausea, vomiting, salivation, labored respiration, muscular paralysis, and asphyxiation (Clayton and Clayton 1981, pp. 2689-90). Redness, pain, and burns occur upon contact with skin. Corrosive effects seen when contact is made with the eyes. Sore throat, coughing, labored breathing, and dizziness occur after inhalation (DASE 1980, p. 757).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 29).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DICHLOROETHYL ETHER

CAS Registry Number: 111-44-4

Synonyms: Bis(2-Chloroethyl) Ether; 1,1'-Oxybis(2-Chloroethane); 1,5-Dichloro-3-Oxapentane; 1-Chloro-2-(beta-Chloroethoxy)Ethane; 2,2'-Dichloroethyl Ether; 2,2'-Dichlorodiethyl Ether; 2,2'-Dichlorethyl Ether; 2-Chloroethyl Ether; beta,beta'-Dichlorodiethyl Ether; beta,beta'-Dichloroethyl Ether; beta,beta-Dichlorodiethyl Ether; bis(2-Chloroethyl)Ether; bis(beta-Chloroethyl) Ether; bis(Chloro-2-Ethyl) Oxide; Chlorex; Chloroethyl Ether; Clorex; DCEE; Di(2-Chloroethyl) Ether; Di(beta-Chloroethyl)Ether; Dichloroether; Dichloroethyl Oxide; ENT 4,504; Ether, bis(2-Chloroethyl); sym-Dichloroethyl Ether

Chemical Formula: $C_4H_8Cl_2O$

Molecular Weight: 143.02

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.33 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 10,000 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 352°F, 178°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.22 at 20/20°C (*Merck 1976)

Vapor Pressure (mmHg): 0.7 at 20°C (*Sax 1979)

Melting Point: -58°F, -50°C (Merck 1983, p. 445)

Vapor Density (AIR=1): 4.93 (*Browning 1965)

Evaporation Rate (Butyl acetate=1): Not Found

DICHLOROETHYL ETHER

SECTION II (continued)

Solubility in Water: Slightly soluble in hot water (*Weast 1979)

Appearance and Odor: Colorless, clear liquid with pungent (*Merck 1976) or nauseating (*ACGIH 1980) or sweet, pleasant odor (*CHRIS 1978). At the vapor concentration necessary to cause respiratory tract damage, the odor is easily detectable and usually intolerable (*Patty 1963)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 15 ppm (90 mg/m^3) (NIOSH 1987, p. 100)

ACGIH TLV: TWA 5 ppm (30 mg/m^3); STEL 10 ppm (60 mg/m^3) (skin) (*ACGIH 1982)

IDLH: 250 ppm (NIOSH/OSHA 1978, p. 82)

Other Limits Recommended: Maximum air concentration (USSR) 2 mg/m^3 (Encyc Occupat Health and Safety 1983, p. 122)

Routes of Entry: **Inhalation:** Yes (*Browning 1965)
Skin: Yes (*Encyc Occupat Health and Safety 1971)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is very toxic; the probable oral lethal dose is 50-500 mg/kg, or between 1 teaspoonful and 1 ounce for a 150 pound person (*Gosselin 1976). It can be a central nervous system depressant in high concentrations. It is extremely irritating to the eyes, nose, and respiratory passages (*Browning 1965). It can penetrate the skin to cause serious and even fatal poisoning (*Encyc Occupat Health and Safety 1971). Poisonous; may be fatal if inhaled, swallowed or absorbed through skin (DOT 1984, Guide 57).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 180°F, 82°C (OC); 131°F, 55°C (CC) (Weiss 1980, p. 325)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use water, foam, mist, fog, spray, or dry chemical (*Sax 1979). Use water in flooding quantities as fog (Student 1981, p. 185). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 57).

DICHLOROETHYL ETHER

SECTION IV (continued)

Special Fire Fighting Procedures: Wear full protective clothing (*NFPA 1978). Do not extinguish fire unless flow can be stopped. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible (Student 1981, p. 185).

Unusual Fire and Explosion Hazards: May form phosgene or hydrogen chloride in fires (*CHRIS 1978). There is danger of explosion when ethers are heated or exposed to flames or sparks. Ethers tend to form peroxides; when ethers containing peroxides are heated, they can detonate (*Sax 1979). May be ignited by heat, sparks, or flames. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers (DOT 1984, Guide 57).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 325)

Conditions to Avoid: Ethers tend to form peroxides upon standing. Heating peroxide-containing ethers can cause detonation (*Sax 1979).

Incompatibility (Materials to Avoid): Reacts vigorously with oleum and chlorosulfonic acid (*Sax 1979).

Hazardous Decomposition or Byproducts: Decomposes in the presence of moisture to form hydrochloric acid (*Martin 1974). Emits toxic fumes when heated to decomposition (*Sax 1979); may form phosgene or hydrochloric acid in fires (*CHRIS 1978).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a chemical intermediate for organic compounds and polymers (*SRI), in the treatment of textiles (*Merck 1976) and in dry cleaning (*Hawley 1977), as a pesticide (*NRC 1977; *Farm Chemicals Handbook 1977), as an anesthetic (*IARC 1972-1985), and for various other applications.

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Remove all ignition sources. Ventilate area of spill or leak. Do not allow this material to enter a confined space, such as a sewer, because of the possibility of an explosion. Absorb spills in vermiculite, dry sand,

DICHLOROETHYL ETHER

SECTION VII (continued)

earth, or similar material (*NIOSH/OSHA 1981). Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Use water spray to knock down vapors (Student 1981, p. 185). Spill or leak: shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. (DOT 1984, Guide 57).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
CPE	GOOD/LIMITED
Teflon	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: At concentrations above 500 ppm, coughing, retching, and vomiting may occur (*Browning 1965), as well as profuse tearing (*Grant 1974). There can be irritation at lower concentrations (*Browning 1965). Contact may cause burns to skin and eyes (DOT 1984, Guide 57).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 57).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ADIPONITRILE

CAS Registry Number: 111-69-3

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 287): Adipic Acid Dinitrile; Adipic Acid Nitrile; Adipodinitrile; 1,4-Dicyanobutane; Hexanedinitrile; Hexanedioic Acid, Dinitrile; Tetramethylene Cyanide

Chemical Formula: $C_6H_8N_2$

Molecular Weight: 108.16

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 563°F, 295°C (Sax 1984, p. 143)

Specific Gravity (H_2O=1): 0.965 at 20/4°C (Sax 1984, p. 143)

Vapor Pressure (mmHg): Not Found

Melting Point: 36.1°F, 2.3°C (Sax 1984, p. 143)

Vapor Density (AIR=1): 3.73 (Sax 1984, p. 143)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (Hawley 1981, p. 21)

ADIPONITRILE

SECTION II (continued)

Appearance and Odor: Water white liquid, practically odorless (Sax 1984, p. 143).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Occupational exposure to nitriles, recommended standard: TWA 18 mg/m^3 (NIOSH/RTECS 1983, Volume 1, p. 287).

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 143)
Skin: Yes (DOT 1984, Guide 55)
Ingestion: Yes (Sax 1984, p. 143)

Health Hazards (Acute, Delayed, and Chronic): This material is toxic by ingestion and inhalation (Hawley 1981, p. 21). It produces disturbances of the respiration and circulation, irritation of the stomach and intestine, and loss of weight (Sax 1984, p. 143). It is irritating to skin and eyes (Weiss 1980, p. 60).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 199.4°F (OC) (Sax 1984, p. 143)
Flammable Limits:
LEL: 1.0% at 200°C (Weiss 1980, p. 60)
UEL: Not Found

Extinguishing Methods: Dry chemical, carbon dioxide, water spray, fog or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Wear chemical protective suit with self-contained breathing apparatus. Cool exposed containers with water (Weiss 1980, p. 60).

Unusual Fire and Explosion Hazards: Combustion products may contain hydrocyanic acid (HCN) (Sax 1984, p. 143). Vapor may explode if ignited in an enclosed area (Weiss 1980, p. 60).

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 60)

ADIPONITRILE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Oxidizing material (Sax 1984, p. 143).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes (Sax 1984, p. 143).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 60)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an intermediate in the manufacture of nylon and in organic synthesis (Hawley 1981, p. 21).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent materal and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

ADIPONITRILE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ADIPONITRILE

(111-69-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Adiponitrile toxicity can occur via ingestion, dermal/eye contact, or inhalation. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility.*

Substance Characteristics:

Pure Forms - Water white to light yellow liquid, or needles at temperatures below 2 degrees C (36 degrees F).

Odor - None.

Uses - Chemical intermediate, solvent, extractant for aromatic hydrocarbons, manufacture of nylon, organic synthesis.

Caution: *Avoid sources of extreme heat or ignition including sparks or fire. Adiponitrile will liberate toxic gases when heated to decomposition. Vapors may explode if ignited in an enclosed area.*

Other Names - Adipic acid dinitrile; adipodinitrile; 1,4-dicyanobutane; hexanedinitrile; tetramethylene cyanide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), diazepam, phenytoin.

Signs and Symptoms of Acute Adiponitrile Exposure:

Warning: *Effects may be delayed. Caution is advised. Vital signs should be monitored closely.*

Signs and symptoms of acute exposure to adiponitrile may include tightness of the chest and tachypnea (rapid respiratory rate). Tachycardia (rapid heart rate), hypotension (low blood pressure), and cyanosis (blue tint to skin and mucous membranes) may also occur. Victims may experience headache, weakness,

ADIPONITRILE

dizziness, difficulty in standing, dilated pupils, confusion, and seizures. Vomiting has been reported. Adiponitrile may irritate or burn the skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to adiponitrile may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to adiponitrile.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with adiponitrile-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to adiponitrile.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with adiponitrile-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

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5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with adiponitrile-contaminated persons or their gastric contents can result in self-poisoning.*

2. RUSH to a health care facility!

3. DO NOT induce vomiting. Ipecac is not recommended for ingestion of adiponitrile.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRICHLOROETHYLSILANE

CAS Registry Number: 115-21-9

Synonyms: Silane, Ethyltrichloro-; Ethyl Silicon Trichloride; Ethyltrichlorosilane; Silane, Ethyl(Trichloro)-; Silane, Trichloroethyl-; Silicane, Trichloroethyl-; Trichloroethylsilicane; Trichloroethylsilicon

Chemical Formula: $C_2H_5Cl_3Si$

Molecular Weight: 163.51

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.0003 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 208°F, 97.9°C (*Weast 1979)

Specific Gravity (H_2O=1): 1.2381 at 20°C/4°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: -158°F, -105.6°C (*Weast 1979)

Vapor Density (AIR=1): 5.6 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water (*Weast 1979)

Appearance and Odor: Trichloroethylsilane is a colorless liquid (*Hawley 1981).

TRICHLOROETHYLSILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Vapor and liquid cause burns. Do not inhale or expose eyes to vapor. Vapor may damage eyes even if not immediately painful (NFPA 1984, pp. 49-89).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 72°F, 22.2°C (OC) (*Sax 1979)
Flammable Limits: May be ignited under almost all normal temperature conditions (*NFPA 1978)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (**Caution:** reacts with water to produce heat and toxic and corrosive fumes -- see Section IV below.) Use dry chemical, alcohol foam, or carbon dioxide; water may be ineffective, but water should be used to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Water spray may be used to flush spills away from exposure and to dilute spills to non-flammable mixtures (*NFPA 1978).

Special Fire Fighting Procedures: Enter fire areas with extreme care. Full protective clothing must be worn including self-contained breathing apparatus, rubber gloves, boots, and bands around arms, legs, and waist. No skin surface should be exposed (*NFPA 1978). Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (*DOT 1984).

Unusual Fire and Explosion Hazards: Trichloroethylsilane may form explosive mixtures with air (*Hawley 1981). Its vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back (*NFPA 1978).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Sax 1979)
Stable:

TRICHLOROETHYLSILANE

SECTION V (continued)

Conditions to Avoid: Decomposing heat (*Sax 1979)

Incompatibility (Materials to Avoid): Will react with water or steam to produce heat and toxic and corrosive fumes. Will react vigorously with oxidizing materials (*Sax 1979).

Hazardous Decomposition or Byproducts: Toxic and corrosive fumes including phosgene when heated to decomposition (*Sax 1979); hydrochloric acid in presence of water (*Hawley 1981).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate for silicones (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors or contact with eyes or skin (see Section III above). Shut off ignition sources; no flares, flames, or smoking. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapor but do not get water inside container. Small spills: take up with sand or other noncombustible absorbent material and containerize. Large spills: dike ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TRICHLOROETHYLSILANE

(115-21-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Sharp, biting.

Commercial Form - Liquid in 1-gallon bottles (in steel containers) or 55-gallon drums.

Use - Chemical intermediate for silicone products.

Materials to Avoid - Oxidizers, water (except for use in emergency life support).

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire. In the presence of water, trichloroethylsilane liberates hydrochloric acid.*

Other Name - Ethyltrichlorosilane, trichloroethylsilicane..

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Trichloroethylsilane Exposure:

Signs and symptoms of acute ingestion of trichloroethylsilane may be severe, and include increased salivation, intense thirst, difficulty swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of trichloroethylsilane.

Acute inhalation exposure may result in sneezing, choking, laryngitis, dyspnea (shortness of breath), respiratory tract irritation, and chest pain. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, pulmonary edema, chronic bronchitis, and pneumonia may also occur. Renal toxicity has been observed in animals.

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If the eyes have come in contact with trichloroethylsilane, then irritation, pain (may be delayed in the case of vapor exposure), swelling, corneal erosion, and blindness may result. Severe burns, pain, shock, and dermatitis (red, inflamed skin) generally follow dermal exposure.

Emergency Life-Support Procedures:

Acute exposure to trichloroethylsilane may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to trichloroethylsilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to trichloroethylsilane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

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7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Rinse mouth with large amounts of water. Victims should not attempt to swallow this water.

3. DO NOT induce vomiting or attempt to neutralize!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMEFOX

CAS Registry Number: 115-26-4

Synonyms: Phosphorodiamidic Fluoride, Tetramethyl-; BFP; BFPO; bis(Dimethylamido)Phosphoryl Fluoride; N,N,N',N'- Tetramethylphosphorodiamidic Fluoride; Dimefox; Tetramethylphosphorodiamidic Fluoride; bis(Dimethylamido)Fluorophosphate; bis(Dimethylamino)Fluorophosphate; Bisdimethylaminofluorophosphine Oxide; CR 409; DIFO; DMF; Fluophosphoric acid Di(Dimethylamide); Hanane; Pestox 14; Pestox IV; Pestox XIV; Phosphine Oxide, bis(Dimethylamino)Fluoro-; Phosphorodiamidic Fluoride, Tetramethyl-; S-14; T-2002; Terra-sytam; Terrasytum; Tetrasytam; Tetramethyldiamidophosphoric Fluoride; TL 792; Wacker S 14/10

Chemical Formula: $C_4H_{12}FN_2OP$

Molecular Weight: 154.13

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 1.0 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 187°F, 86°C at 15 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.115 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 0.36 at 25°C (*Martin 1974)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

DIMEFOX

SECTION II (continued)

Solubility in Water: Freely soluble (*Merck 1976)

Appearance and Odor: Colorless liquid (*Martin 1974) with a fishy odor (*Merck 1976)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Martin 1974)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose (human) is 5-50 mg/kg, or 7 drops to 1 teaspoonful for a 150-lb. person. Death may occur from respiratory arrest (*Gosselin 1976). Hazards of vapor toxicity are high (*Martin 1974).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Insecticide, Liquid, Poisonous, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Insecticide, Liquid, Poisonous, n.o.s.) Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Ventilate closed spaces before entering them. Move container from fire area if you can do so without risk. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Highly toxic fumes are given off upon decomposition with heat (*Sax 1975). (Non-Specific -- Insecticide, Liquid, Poisonous, n.o.s.) Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

DIMEFOX

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Sunshine 1969)

Conditions to Avoid: Decomposing heat (*Sax 1975); contact with chlorine (*Sunshine 1969).

Incompatibility (Materials to Avoid): Decomposes rapidly in the presence of chlorine. Oxidizes slowly in strong oxidizing agents (*Sunshine 1969).

Hazardous Decomposition or Byproducts: Highly toxic fumes are given off when material is heated to decomposition (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide; it is neither produced nor used in the U.S. (*SRI). Not registered as a pesticide in the U.S. (USEPA/ Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). (Non-Specific -- Insecticide, Liquid, Poisonous, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

DIMEFOX

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include headache, blurred vision, nausea, cramps, difficulty in breathing, slurring of speech, and excessive salivation (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Insecticide, Liquid, Poisonous, n.o.s.) Move victim to fresh air; 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 the 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ENDOSULFAN

CAS Registry Number: 115-29-7

Synonyms: 5-Norbornene-2,3-Dimethanol, 1,4,5,6,7,7-Hexachloro-, Cyclic Sulfite; 1,2,3,4,7,7-Hexachlorobicyclo[2.2.1]Hepten-5,6-Bioxymethylenesulfite; 1,2,3,4,7,7-Hexachlorobicyclo-[2.2.1]-Hepten-5,6-Bisoxymethylene Sulfite; 1,2,3,4,7,7-Hexachlorobicyclo[2.2.1]-2-Heptene-5,6-Bisoxymethylene Sulfite; 1,4,5,6,7,7-Hexachloro-5-Norbornene-2,3-Dimethanol Cyclic Sulfite; 1,4,5,6,7,7-Hexachloro-8,9,10-Trinorborn-5-en-2,3-ylenedimethyl Sulphite; 6,7,8,9,10,10-Hexachloro-1,5,5A,6,9,9A-Hexahydro-6,9-Methano-2,4,3-Benzo[e]dioxathiepin-3-Oxide; 6,9-Methano-2,4,3-Benzodioxathiepin, 6,7,8,9,10,10-Hexachloro-1,5,5A,6,9,9A-Hexahydro-, 3-Oxide; alpha, beta-1,2,3,4,7,7-Hexachlorobicyclo[2.2.1]-2-Heptene-5,6-Bisoxymethylene Sulfite; AS 4314; Benzoepin; Beosit; BIO 5,462; Chlorthiepin; Crisulfan; Cyclodan; Devisulphan; Endocel; Endosol; Endosulphan; Ensure; ENT 23,979; FMC 5462; Hexachlorohexahydromethano-2,4,3-Benzodioxathiepin-3-Oxide; Hildan; HOE 2,671; Insectophene; Kop-Thiodan; Malix; NCI C00566; NIA 5462; Niagara 5,462; OMS 570; Sulfurous Acid, Cyclic Ester with 1,4,5,6,7,7-Hexachloro-5-Norbornene-2,3-Dimethanol; Thifor; Thimul; Thiodan; Thiofor; Thiomul Thionex; Thiosulfan; Thiosulfan Tionel; Thiotox [Insecticide]; Tionex; Tiovel; 6,7,8,9 10,10-Hexachloro-1,5,5a,6,9,9a-Hexahydro-6,9-Methano-2,4,3-Benzodioxathiepin-3-Oxide

Chemical Formula: $C_9H_6Cl_6O_3S$

Molecular Weight: 406.95

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.08 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS (Continued)

Physical State: Solid

Boiling Point: Not Found

ENDOSULFAN

SECTION II (continued)

Specific Gravity (H_2O=1): 1.745 at 20°C (Farm Chemicals Handbook 1984, p. C-92)

Vapor Pressure (mmHg): 0.00001 at 77°F, 25°C (*Worthing 1979)

Melting Point: a isomer 228.7°F, 109.2°C; b isomer 415.9°F, 213.3°C (Farm Chemicals Handbook 1984, p. C-92). Mixture 158-212°F, 70-100°C (Buchel 1983, p. 47; Hayes 1982, p. 252)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (Merck 1983, p. 516)

Appearance and Odor: Brown crystals (*Merck 1983); colorless crystals (*Spencer 1982); smells like sulfur dioxide (Hayes 1982, p. 252)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 mg/m^3 (skin) (ACGIH 1986-87, p. 18)

IDLH: Not Found

Other Limits Recommended: Maximum air concentration (USSR) 0.1 mg/m^3 (Encyc Occupat Health and Safety 1983, p. 1634).

Routes of Entry: **Inhalation:** Yes (Hawley 1984, p. 410)
Skin: Yes (Sax 1984, p. 377)
Ingestion: Yes (Sax 1984, p. 377)

Health Hazards (Acute, Delayed, and Chronic): It is very toxic. The probable oral lethal dose is 50 to 500 mg/kg, or 1 teaspoonful to 1 ounce for a 150 lb. person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use water in flooding quantities as fog. Use alcohol foam, carbon dioxide or dry chemical (Student 1981, p. 220).

ENDOSULFAN

SECTION IV (continued)

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Container may explode in heat of fire. Fire or run off from fire control water may release irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*White-Stevens 1971)

Conditions to Avoid: Slowly oxidizes in air (*White-Stevens 1971). Do not store at temperature below 20°F (Farm Chemicals Handbook 1984, p. C-92).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide for vegetable crops, fruits, and nuts (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

In case of spills, stay upwind; stay out of low areas. Use water spray to reduce vapors. Ventilate closed spaces before entering them. Do not touch 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 spill for later disposal (DOT 1984, Guide 55).

ENDOSULFAN

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ENDOSULFAN

(115-29-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless crystals.

Odor - Pungent, resembles sulfur dioxide.

Commercial Forms - Brown crystals, wettable powder, dust, granules, or in combination with dimethoate and parathion-methyl.

Use - Pesticide.

Materials to Avoid - Alkali, water (except for use in emergency life support).

Other Names - Benzoepin; Beosit; Chlorthiepin; Crisulfan; Cyclodan; Devisulphan; Endosol; Ensure; Hildan; Insectophene; Malix; 5-norbornene-2,3-dimethanol, 1,4,5,6,7,7-hexachlorocyclic sulfite; Thiodan; Thimul; Thionex; Thiotox; Tionex.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, alcohol, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, thiopental, succinylcholine, cholestyramine.

Signs and Symptoms of Acute Endosulfan Exposure:

Ingestion of endosulfan may result in nausea, vomiting, and diarrhea. Dizziness, agitation, nervousness, tremor, incoordination, and convulsions may also occur. Central nervous system depression may terminate in respiratory failure. Contact with endosulfan may irritate or burn the skin, eyes, and mucous membranes.

ENDOSULFAN

Emergency Life-Support Procedures:

Acute exposure to endosulfan may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to endosulfan.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to endosulfan.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times. An initial soap and water wash should be followed by an alcohol wash. The third wash should again be with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

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Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of endosulfan is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of endosulfan may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FENSULFOTHION

CAS Registry Number: 115-90-2

Synonyms: Phosphorothioic Acid, O,O-Diethyl O-(p-(Methysulfinyl)Phenyl) Ester; Agricur; B 25141; Bay 25141; Bayer 25141; Bayer S767; Chemagro 25141; Daconit; Dasanit; Dazanit; Desanit; Diethyl p-Methylsulfinylphenyl Thiophosphate; DMSP; ENT 24,945; O,O-Diethyl O-(4-(Methylsulfinyl)Phenyl) Phosphorothioate; O,O-Diethyl O-(p-(Methylsulfinyl)Phenyl) Phosphorothioate; Phenol, p-(Methylsulfinyl)-, O-Ester With O,O-Diethyl Phosphorothioate; Phosphorothioic Acid, O,O-Diethyl-O-(4-(Methylsulfinyl)Phenyl) Ester; S 767; Terracur P; VUAGT; VUAGT 108; VUAGT 96

Chemical Formula: $C_{11}H_{17}O_4PS_2$

Molecular Weight: 308.35

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 2 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 280-286°F, 138-141°C at 0.01 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.202 (*Spencer 1973)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

FENSULFOTHION

SECTION II (continued)

Solubility in Water: 1.54 g/liter (*Worthing 1979)

Appearance and Odor: Oily yellow liquid (*Worthing 1979); brown liquid (*Spencer 1973)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 mg/m^3 (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organic Phosphorus Pesticides) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organic Phosphorus Pesticides) (Hayes 1982, p. 301)
Ingestion: Yes (Non-Specific -- Organic Phosphorus Pesticides) (Hayes 1982, p. 301)

Health Hazards (Acute, Delayed, and Chronic): It displays cholinesterase inhibiting properties (*ACGIH 1980). Death results primarily from respiratory arrest stemming from failure of the respiratory center, paralysis of respiratory muscles and intense bronchoconstriction (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn but may not ignite readily. Containers may explode in heat of fire (DOT 1984, Guide 55).

FENSULFOTHION

SECTION IV (continued)

When heated highly toxic fumes of phosphorus and sulfur oxides are emitted (*Sax 1979).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Menzie 1969)

Conditions to Avoid: Hydrolyzes in alkali, isomerizes in air (*Menzie 1969).

Incompatibility (Materials to Avoid): Incompatible with alkali chemicals (*Menzie 1969).

Hazardous Decomposition or Byproducts: Sulfur oxides and phosphorous oxides are formed when heated to decomposition (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide, nematocide (*SRI), and mosquito larvicide (*Spencer 1973).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Keep unnecessary people away; stay upwind. Do not touch spilled material; stop leak if possible. Use water spray to reduce vapors. Take up with noncombustible absorbent material. For large spills, dike far ahead of spill (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

FENSULFOTHION

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This material may cause nausea, vomiting, abdominal cramps, diarrhea, headache, giddiness, vertigo, weakness, lack of muscle control, tearing, slurring of speech, difficult breathing, convulsions, excessive salivation, tightness in chest, and death from respiratory arrest (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with the 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ALDICARB

CAS Registry Number: 116-06-3

Synonyms: Propionaldehyde, 2-Methyl-2-(Methylthio)-, O-(Methylcarbamoyl)Oxime; 2-Methyl-2-(Methylthio)Propanal, O-((Methylamino)Carbonyl) Oxime; 2-Methyl-2-(Methylthio)Propionaldehyde O-(Methylcarbamoyl)Oxime; Aldecarb; Carbamic Acid, Methyl-, O-((2- Methyl-2-(Methylthio)Propylidene) Amino) Derivative; Carbamyl; Carbanolate; ENT 27,093; NCI-C08640; OMS 771; Propanal, 2-Methyl-2-(Methylthio)-, O-((Methylamino)Carbonyl)Oxime; Propionaldehyde, 2-Methyl-2-(Methylthio)-, O-(Methylcarbamoyl)Oxime; UC 21149; Union Carbide 21149; Union Carbide UC-21149; Temik TSK; Sulfone aldoxycarb; Temic; Ambush; Propanal, 2-Methyl-2-(Methylthio)-, O-((Methylamino)Carbonyl) Oxime; Temic; Temik; Temik 10 G; Temik G 10

Chemical Formula: $C_7H_{14}N_2O_2S$

Molecular Weight: 190.23

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 0.3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.1950 at 25°C (*Farm Chemicals Handbook 1983)

Vapor Pressure (mmHg): Less than 0.5 at 20°C (*Sunshine 1969)

Melting Point: 210-214°F, 99-101°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

ALDICARB

SECTION II (continued)

Solubility in Water: 6 g/liter at 25°C (*Merck 1983)

Appearance and Odor: White crystals, slightly sulfurous odor (*Spencer 1982); commercial formulations are granular (*Farm Chemicals Handbook 1985)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (*Doull 1980)
Ingestion: Yes (*Doull 1980)

Health Hazards (Acute, Delayed, and Chronic): Aldicarb is a carbamate pesticide (Hayes 1981, p. 447). This material is super toxic; the probable oral lethal dose for humans is less than 5 mg/kg, or a taste (less than 7 drops) for a 150-lb. person (*Gosselin 1976); it is extremely toxic by both oral and dermal routes (*Doull 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamate Pesticide, Solid) Some of these materials may burn but none of them ignite readily. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Carbamate Pesticide, Solid) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and sulfur oxides (*Sax 1984).

NFPA Flammability Rating: Not Found

ALDICARB

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NIH 1979)

Conditions to Avoid: Unstable in alkali; poor stability at 122°F, 50°C (*Sunshine 1969).

Incompatibility (Materials to Avoid): Incompatible with highly alkaline substances (*Farm Chemicals Handbook 1983).

Hazardous Decomposition or Byproducts: When heated, aldicarb emits very toxic fumes of nitrogen oxides and sulfur oxides (*Sax 1984).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide, acaricide, and nematocide (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide, solid) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ALDICARB

(116-06-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White crystals.

Odor - Slightly sulfurous.

Commercial Form - 5 to 15% active ingredient in granular form (technical grade is 99+% pure).

Use - Pesticide.

Caution: *Avoid sources of heat including fire. Aldicarb will liberate toxic nitrogen and sulfur oxide gases when heated.*

Other Names - Carbamyl; Carbanolate; propionaldehyde, 2-methyl-2-(methylthio)-, O-(methylcarbamoyl)oxime; Temik; Union Carbide 21149.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, diazepam, phenytoin.

Signs and Symptoms of Acute Aldicarb Exposure:

Acute exposure to aldicarb usually leads to a cholinergic crisis, with signs and symptoms that may include increased salivation, lacrimation (tearing), perspiration, and spontaneous defecation and urination. Pinpoint pupils, blurred vision, tremor, muscle twitching, shortness of breath, mental confusion, convulsions, and coma may also occur. Gastrointestinal effects include nausea, vomiting, diarrhea, and abdominal pain. Bradycardia (slow heart rate) occurs frequently.

ALDICARB

Emergency Life-Support Procedures:

Acute exposure to aldicarb may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to aldicarb.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to aldicarb.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

ALDICARB

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of aldicarb is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of aldicarb may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOPROPYLMETHYLPYRAZOLYL DIMETHYLCARBAMATE

CAS Registry Number: 119-38-0

Synonyms: Carbamic Acid, Dimethyl-, 1-Isopropyl-3-Methylpyrazol-5-yl Ester; 1-Isopropyl-3-Methyl-5-Pyrazolyl Dimethylcarbamate; 5-Methyl-2-Isopropyl-3-Pyrazolyl Dimethylcarbamate; Carbamic Acid, Dimethyl-, 1-Isopropyl-3-Methylpyrazol-5-yl Ester; Carbamic Acid, Dimethyl-, 3-Methyl-1-(1-Methylethyl)-1H-Pyrazol-5-yl Ester; Dimethyl-5-(1-Isopropyl-3-Methyl-Pyrazolyl)-Carbamate; Dimethylcarbamic Acid 1-Isopropyl-3-Methylpyrazol-5-yl Ester; Dimethylcarbamic Acid 3-Methyl-1-(1-Methylethyl)-1H-Pyrazol-5-yl Ester; ENT 19,060; G 23611; Primin; Pyrazol-5-ol, 1-Isopropyl-3-Methyl-, Dimethylcarbamate; Saolan; Isolan

Chemical Formula: $C_{10}H_{17}N_3O_2$

Molecular Weight: 211.27

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (rat) 5.6 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 217°F, 103°C at 0.7 mm (*Sax 1979)

Specific Gravity (H_2O=1): 1.07 at 20°C (*Sax 1979)

Vapor Pressure (mmHg): 0.001 at 20°C (*Sunshine 1969)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

ISOPROPYLMETHYLPYRAZOLYL DIMETHYLCARBAMATE

SECTION II (continued)

Solubility in Water: Miscible in water (*Hawley 1977)

Appearance and Odor: Colorless liquid (Hayes 1982, p. 454)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Gosselin 1984, p. II-306)
Skin: Yes (Sax 1984, p. 1170)
Ingestion: Yes (Sax 1984, p. 1170)

Health Hazards (Acute, Delayed, and Chronic): It is classified as extremely toxic. Probable oral lethal dose in humans is 5-50 mg/kg or between 7 drops and 1 teaspoonful for a 150-lb. person (*Gosselin 1976). A cholinesterase inhibitor; although it is not an organic phosphate, it resembles that group in action (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use methods for liquid carbamate pesticides (Hayes 1982, p. 454). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: As with other liquid carbamate pesticides (Hayes 1982, p. 454), keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1170).

NFPA Flammability Rating: Not Found

ISOPROPYLMETHYLPYRAZOLYL DIMETHYLCARBAMATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1170).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Systemic aphicide used in Europe (Buchel 1983, p. 128); insecticide (Merck 1983, p. 744). Currently of little commercial interest (*Worthing 1979). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Treat as a liquid carbamate pesticide (Hayes 1982, p. 454). Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Can cause death due to respiratory arrest. Symptoms include cool extremities; trembling; fixed pinpoint pupils; nausea; vomiting; slight bluing of skin; lips and nailbeds; tearing; diarrhea; excessive salivation; sweating; slurring of speech; jerky movements; loss of bladder control; convulsions; coma and death (*Gosselin 1976, Gosselin 1984, p. II-306).

ISOPROPYLMETHYLPYRAZOLYL DIMETHYLCARBAMATE

SECTION IX (continued)

Emergency and First Aid Procedures: A liquid carbamate pesticide (Hayes 1982, p. 454). Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FENITROTHION

CAS Registry Number: 122-14-5

Synonyms: 8057HC; 80557HC; AC 47,300; Accothion; Aceothion; Agrothion; Akotion; Bay 41831; Bayer 41831; Bayer S 5660; CL 47300; CP 47114; Cyfen; Cytel; ENT 25,715; Falithion; Fentrothione; Folithion; m-Cresol, 4-Nitro-, O-Ester with O,O-Dimethyl Phosphorothioate; MEP (Pesticide); Metathio E-50; Metathion; Metathione; Metathionine; Metathionine E50; Metation; Methathion; Methylnitrophos; Nitrophos; Novathion; Nuvanol; O,O-Dimethyl O-(3-Methyl) Phosphorothioate; O,O-Dimethyl O-(3-Methyl-4-Nitrophenyl) Thiophosphate; O,O-Dimethyl O-(4-Nitro-3-Methylphenyl)Thiophosphate; O,O-Dimethyl O-4-Nitro-m-Tolyl Phosphorothioate; Oleosumifene; OMS 43; Ovadofos; Phenitrothion; Phosphorothioic Acid, O,O-Dimethyl O-(3-Methyl-4-Nitrophenyl) Ester; Phosphorothioic Acid, O,O-Dimethyl O-(4-Nitro-m-Tolyl) Ester; S 112A; S 5660; S-1102A; Sumithian; Sumithion

Chemical Formula: $C_9H_{12}NO_5PS$

Molecular Weight: 277.25

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.378 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 244°F, 118°C at 0.05 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.32 at 25/4°C (*Martin 1974)

Vapor Pressure (mmHg): 0.000006 at 20°C (*Martin 1974)

Melting Point: Not Found

FENITROTHION

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (*Merck 1976)

Appearance and Odor: Brownish-yellow oil (*Martin 1974; *Merck 1976)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 1174)
Ingestion: Yes (Sax 1984, p. 1174)

Health Hazards (Acute, Delayed, and Chronic): This compound is an organophosphate insecticide. It is a highly toxic cholinesterase inhibitor (Hawley 1981, p. 452) that acts on the nervous system (Doull 1980, p. 367). Does not cause delayed neurotoxicity and contact produces little irritation (Hayes 1982, p. 365).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is an organophosphate insecticide (Encyc Occupat Health and Safety 1983, p. 1623). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphate Pesticide n.o.s.) Move containers from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

FENITROTHION

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes, for 2 years if stored at 20-25°C (Hayes 1982, p. 365)

Conditions to Avoid: Unstable in alkaline media. Do not store above 40°C (Hayes 1982, p. 365).

Incompatibility (Materials to Avoid): Unstable in alkaline media (Hayes 1982, p. 365)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of oxides of nitrogen, phosphorus and sulfur (Sax 1984, p. 1174). Decomposition at 100-140°C produces a mixture of organophosphorus polymers (*Menzie 1969).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is a selective acaricide (*Martin 1974) and a contact and stomach insecticide (*Spencer 1973). Used to control chewing and sucking insects on rice, orchard fruits, vegetables, cereals, cotton and forest. Also protects against flies, mosquitoes, and cockroaches (Farm Chemicals Handbook 1984, p. C-101).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphate Pesticide n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

FENITROTHION

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Nausea is often the first symptom, followed by vomiting; abdominal cramps; diarrhea; excessive salivation; headache; giddiness; dizziness; weakness; tightness in the chest; loss of muscle coordination; slurring of speech, muscle twitching (particularly the tongue and eyelid); respiratory difficulty; blurring or dimness of vision; pinpoint pupils; profound weakness; mental confusion; disorientation and drowsiness (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphate Pesticide n.o.s) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDROQUINONE

CAS Registry Number: 123-31-9

Synonyms: 1,4-Benzenediol; 1,4-Dihydroxybenzene; 4-Hydroxyphenol; Alpha-Hydroquinone; Arctuvin; Benzohydroquinone; Benzoquinol; Beta-Quinol; Black and White Bleaching Cream; Diak 5; Dihydroxybenzene; Eldopaque; Eldoquin; HE 5; Hydroquinol; Hydroquinole; NCI-C55834; p-Benzenediol; p-Dihydroxybenzene; p-Dioxobenzene; p-Hydroquinone; p-Hydroxyphenol; para-Dihydroxybenzene; para-Dioxybenzene; para-Hydroquinone; Phiaquin; Quinol; Tecquinol; Tenox HQ; Tequinol; USAF EK-356

Chemical Formula: $C_6H_6O_2$

Molecular Weight: 110.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 545-549°F, 285-287°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.332 at 15°C (Merck 1983, p. 699)

Vapor Pressure (mmHg): 4 at 150°C (*Clayton and Clayton 1981-82)

Melting Point: 338-340°F, 170-171°C (*Merck 1976)

Vapor Density (AIR=1): 3.81 (*Sax 1975)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 14 parts water (*Merck 1976)

HYDROQUINONE

SECTION II (continued)

Appearance and Odor: Colorless (*Sax 1975) to white crystals (*IARC 1972-1985).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 2 mg/m^3 (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 2 mg/m^3 (ACGIH 1986-87, p. 21)

IDLH: 200 mg/m^3 (NIOSH/OSHA 1978, p. 114)

Other Limits Recommended: NIOSH: 2 mg/m^3 15-minute ceiling (NIOSH 1987, p. 140)

Routes of Entry: Inhalation: Yes (*DOT 1984)
Skin: Yes (*IARC 1972-1985)
Ingestion: Yes (*IARC 1972-1985)

Health Hazards (Acute, Delayed, and Chronic): This material is very toxic; the probable oral lethal dose for humans is 50-500 mg/kg, or between 1 teaspoon and 1 ounce for a 150 lb. person. It is irritating but not corrosive. Fatal human doses have ranged from 5-12 grams, but 300-500 mg have been ingested daily for 3-5 months without ill effects (*Gosselin 1976). Death is apparently initiated by respiratory failure or anoxia (*Encyc Occupat Health and Safety 1971).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 329°F (CC) (*Sax 1975)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires use dry chemical, carbon dioxide, water spray or foam. Move container from fire area if you can do so without risk (*DOT 1984). This compound is a slight fire or explosion hazard (*NFPA 1978).

Special Fire Fighting Procedures: Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Dust cloud may explode if ignited in an enclosed area (*CHRIS 1978).

NFPA Flammability Rating: 1

HYDROQUINONE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Oxidizes in air (Merck 1983, p. 699)

Incompatibility (Materials to Avoid): It can react with oxidizing materials (*Sax 1975) and is rapidly oxidized in the presence of alkaline materials (*Merck 1976).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Photographic developer and reducer; antioxidant for fats and oils; polymerization inhibitor; stabilizer in paints, varnishes, motor fuels, and oils; in human medicine for skin blemishes; chemical intermediate for dyes; reagent in phosphate analysis (*SRI; *Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do it without risk. Small spills: take up with sand or other non-combustible 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Neoprene	GOOD/LIMITED*
Nitrile	GOOD/LIMITED*
PE	GOOD/LIMITED

HYDROQUINONE

SECTION VIII (continued)

PVC	GOOD/LIMITED
Viton	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for HYDROQUINONE

(123-31-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to white crystals.

Commercial Form - Light tan to light gray crystals in glass bottles, paper sacks, or fiber drums.

Uses - Photographic developer and reducer, antioxidant for fats and oils, polymerization inhibitor, reagent in phosphate analysis, paint and varnish stabilizer, component in fuel mixtures.

Materials to Avoid - Alkali, oxidizers.

Other Names - Arctuvin, 1,4-benzenediol, Diak 5, 1,4-dihydroxybenzene, para-dihydroxybenzene, Eldoquin, 4-hydroxyphenol, Phiaquin, Quinol, Tecquinol, Tenox HQ.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, methylene blue, castor oil.

Signs and Symptoms of Acute Hydroquinone Exposure:

Signs and symptoms of acute exposure to hydroquinone may be severe and include dyspnea (shortness of breath), a sense of suffocation, increased respiratory rate, and respiratory failure. Pallor (paleness of the skin), cyanosis (blue tint to skin and mucous membranes), and cardiovascular collapse may occur.

Neurologic effects include headache, tinnitus (ringing in the ears), dizziness, delirium, muscle twitching, tremor, and convulsions. Nausea, vomiting, and the production of green to brown-green urine may also occur. Hydroquinone may be irritating and corrosive to the skin, eyes, and mucous membranes. Jaundice (yellow tint to skin) may be noticed.

HYDROQUINONE

Emergency Life-Support Procedures:

Acute exposure to hydroquinone may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydroquinone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydroquinone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

HYDROQUINONE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen.

2. IMMEDIATELY give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of hydroquinone is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of hydroquinone may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CROTONALDEHYDE, (E)-

CAS Registry Number: 123-73-9

Synonyms: (E)-Crotonaldehyde; 2-Butenal (trans); 2-Butenal, (E)-; beta-Methyl Acrolein; Crotenaldehyde; Crotonal; Crotonaldehyde; Crotonic Aldehyde; E-2-Butenal; NCI-C56279; Propylene Aldehyde; Topanel; Topanel CA; trans-2-Butenal; trans-Crotonaldehyde

Chemical Formula: C_4H_6O

Molecular Weight: 70.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (guinea pig) 25.59 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 219.2°F, 104°C (*Sunshine 1969)

Specific Gravity (H_2O=1): 0.853 at 20°C/20°C (Merck 1983, p. 372)

Vapor Pressure (mmHg): 19 at 20°C (*Sunshine 1969)

Melting Point: -101°F, -74°C (*Weast 1979)

Vapor Density (AIR=1): 2.41 (Merck 1983, p. 372)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 18.1 g/100 mL at 20°C (Merck 1983, p. 372)

Appearance and Odor: Crotonaldehyde is a water-white to straw-colored liquid (*NFPA 1978) with a pungent, suffocating odor (ACGIH 1980, p. 107).

CROTONALDEHYDE, (E)-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 2 ppm (6 mg/m^3) (NIOSH 1987, p. 88)

ACGIH TLV: TWA 2 ppm (6 mg/m^3) (ACGIH 1986-87, p. 14)

IDLH: 400 mg/m^3 (NIOSH/OSHA 1978, p. 72)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*NFPA 1978)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Although slightly less toxic, crotonaldehyde is similar chemically and toxicologically to acrolein (*Gosselin 1976) which is rated as extremely toxic (Gosselin 1984, p. VI-186). Toxic concentrations for human inhalation have been reported at 12 mg/m^3/10 minutes. Irritant dose to human eye is 45 ppm (*NIOSH/RTECS 1985). As with acrolein, vapor exposures cause severe and painful eye irritation, damage to cornea, lacrimation (tearing), irritation of nasal membranes, pulmonary edema (filling of lungs with fluid) (*NFPA 1978, *Rumack 1975 to Present) and gastrointestinal distress when ingested (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 13°C (OC) (Merck 1983, p. 372)
Flammable Limits:
LEL: 2.1% (*Sunshine 1969)
UEL: 15.5% (*Sunshine 1969)

Extinguishing Methods: Use dry chemical, foam, or carbon dioxide; water may be ineffective but should be used to keep fire-exposed containers cool. If leak or spill has not ignited, use water spray to disperse vapors. Water spray may be used to flush spills away from exposures (*NFPA 1978).

Special Fire Fighting Procedures: All exposed skin surfaces should be covered. Wear protective clothing including self-contained breathing apparatus, coat, pants, gloves, boots, and bands around arms, wrists, legs, and waist. Massive or advanced fires should be fought from a safe distance or protected location (*NFPA 1978). Isolate area for one-half mile in all directions if tank car or truck involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Vapors form explosive mixtures in air (*NFPA 1978) or in sewers (*NIOSH/OSHA 1981).

NFPA Flammability Rating: 3

CROTONALDEHYDE, (E)-

SECTION V -- REACTIVITY DATA

Stability: Unstable: Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Oxygen, heat, elevated pressures (*NFPA 1978)

Incompatibility (Materials to Avoid): Nitric acid (Sax 1984, p. 817).

Hazardous Decomposition or Byproducts: Hazardous peroxides and acids (*NFPA 1978).

Hazardous Polymerization: May Occur: Yes (*NFPA 1978)
May Not Occur:

Conditions to Avoid: Contact with alkaline materials such as caustic ammonia or amines, or at elevated temperatures (*NFPA 1978).

SECTION VI -- USE INFORMATION

Chemical intermediate for several compounds in a variety of industrial processes (surfactants, textiles, paper, fuels, insecticides, leather tanning, etc.) (*SRI). Used in chemical warfare (Merck 1983, p. 372).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Remove all ignition sources and ventilate area of spill (*NIOSH/OSHA 1981). No flares, smoking, or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Irritation of eyes causes reddening and intense lacrimation (tearing) and pain, irritation to nasal membranes and difficulty in breathing (*Rumack 1975 to Present, *ACGIH 1980); abdominal distress when ingested (*Rumack 1975 to Present).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration; if breathing is difficult, give oxygen. Remove and isolate contaminated

SECTION IX (continued)

clothing and shoes at site if possible. In case of contact with liquid material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 28).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM CACODYLATE

CAS Registry Number: 124-65-2

Synonyms: Arsine Oxide, Dimethylhydroxy-, Sodium Salt; Alkarsodyl; Ansar 160; Ansar 560; Arsecodile; Arsicodile; Arsine Oxide, Hydroxydimethyl-, Sodium Salt; Arsinic Acid, Dimethyl-, Sodium Salt; Arsycodile; Arsysodila; Cacodylic Acid Sodium Salt; Cacodylic Acid, Sodium Salt; Chemaid; Hydroxydimethylarsine Oxide, Sodium Salt; Rad-E-Cate; Silvisar; Sodium Dimethylarsinate; Sodium Dimethylarsonate; Sodium Salt of Cacodylic Acid; [(Dimethylarsino)oxy]Sodium As-Oxide

Chemical Formula: $C_2H_7AsO_2Na$

Molecular Weight: 159.98

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 4 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 140°F, 60°C for trihydrate (*Weast 1979); liquifies in water of hydration at 140°F, 60°C and becomes anhydrous at 284°F, 120°C for trihydrate (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

SODIUM CACODYLATE

SECTION II (continued)

Solubility in Water: Soluble; 2000 g/liter at 15-20°C for trihydrate (*Weast 1979)

Appearance and Odor: White, amorphous crystals or powder (*Hawley 1977) with a slight odor (*Merck 1976)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.010 mg/m^3, as arsenic (NIOSH 1987, p. 54)

ACGIH TLV: (Arsenic and soluble compounds) TWA 0.2 mg/m^3 (ACGIH 1986-87, p. 10)

IDLH: Not Found

Other Limits Recommended: (Arsenic and compounds) **NIOSH:** 0.002 mg/m^3 15-minute ceiling, as arsenic (NIOSH 1987, p. 54)

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Hayes 1982, p. 42)

Health Hazards (Acute, Delayed, and Chronic): Moderately toxic; probable oral lethal dose in humans is 0.5-5 g/kg or between 1 ounce and 1 pint (or 1 lb.) for a 70 kg (150 lb.) person (*Gosselin 1976). It may cause disturbances of the blood, kidneys, and nervous system (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area. Stay upwind; keep out of low areas. Wear self-contained breathing apparatus and full protective clothing. Move container from fire area, if you can do so without risk (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: Poisoning potential is high when heated to decomposition (*Sax 1979).

NFPA Flammability Rating: Not Found

SODIUM CACODYLATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Water solution in contact with active metals (iron, aluminum, zinc) (*Sax 1979)

Hazardous Decomposition or Byproducts: Dangerous when heated to decomposition or on contact with acids or acid fumes, because it emits highly toxic fumes of arsenic (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material has been used as a nonselective herbicide and for general weed control (*Farm Chemicals Handbook 1961).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for SODIUM CACODYLATE

(124-65-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless or white to light yellow crystals or powder.

Odor - None.

Commercial Forms - Colorless to light yellow crystalline solid or concentrated solution.

Uses - Herbicide, veterinary medicine.

Caution: *Avoid sources of extreme heat including fire. Sodium cacodylate will liberate toxic arsenic fumes when heated to decomposition.*

Other Names - Alkarsodyl; Arsecodile; Bophy; cacodylic acid, sodium salt; Chemaid; Phytar 560; Rad-E-Cate; Silvisar; sodium dimethylarsonate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, sodium bicarbonate, dimercaprol, penicillamine, dopamine, norepinephrine, KCl.

Signs and Symptoms of Acute Sodium Cacodylate Exposure:

Warning: *Effects usually appear within 30 to 60 minutes but may be delayed for several hours. Caution is advised.*

Acute exposure to sodium cacodylate may be fatal. Headache, red-stained eyes, and a garlicky odor of the breath may be the first effects noticed. Other signs and symptoms include generalized weakness, intense thirst, muscle cramping, seizures, toxic delirium, and shock. Nausea, vomiting, anorexia, abdominal pain, and diarrhea may occur. Hypotension (low blood pressure), tachycardia (rapid heart rate), pulmonary edema, ventricular fibrillation, and other cardiac abnormalities are usually found following severe exposure. Sodium cacodylate is corrosive to the skin, eyes, and mucous membranes.

SODIUM CACODYLATE

Emergency Life-Support Procedures:

Acute exposure to sodium cacodylate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to sodium cacodylate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to sodium cacodylate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas for at least 15 minutes with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

SODIUM CACODYLATE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PICROTOXIN

CAS Registry Number: 124-87-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 175) Cocculin; Cocculus; Cocculus Solid; Fish Berry; Indian Berry; Oriental Berry; Picrotin, compound with Picrotoxinin (1:1); Picrotoxine; 3,6-Methano-8H-1,5,7-Trioxacyclopenta[ij]Cycloprop[a]Azulene-4,8(3H)-Dione, Hexahydro-2a-Hydroxy-9-(1-Hydroxy-1-Methylethyl)-8b-Methyl-, [1aR-(1a.alpha.,2a. beta.,3.beta., 6.beta.,6a.beta.,8aS*,8b.beta.,9S*)]-, compound with [1aR-(1a.alpha.,2a.beta., 3.beta.,6.beta.,6a.beta.,8aS*,8b.beta,9R*)]-Hexahydro-2a-Hydroxy-8b-Methyl-9-(1-Methylethenyl)-3,6-Methano-8H-1,5,7-Trioxacyclopenta[ij] Cycloprop[a] Azulene-4,8(3H)-Dione(1:1)

Chemical Formula: $C_{30}H_{34}O_{13}$ (Weast 1983, p. C456)

Molecular Weight: 602.60 (Weast 1983, p. C456)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 15 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 397°F, 203°C (Merck 1983, p. 1069)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

PICROTOXIN

SECTION II (continued)

Solubility in Water: 1 g/350 mL (Merck 1983, p. 1069)

Appearance and Odor: Shiny leaflets with intensely bitter taste (Merck 1983, p. 1069); microcrystalline powder. Odorless (Hawley 1981, p. 816)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Gilman 1985, p. 585)
Skin: Yes (Gilman 1985, p. 585)
Ingestion: Yes (Sax 1984, p. 2231)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic and a dose of 20 mg may produce symptoms of severe poisoning (Gilman 1985, p. 585). A human lethal dose of 1.5 mg/kg has been reported (NIOSH/RTECS 1983, Volume 3, p. 175). It is an alkaloid convulsant poison (Sax 1984, p. 2231).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Alkaloid) Use dry chemical, carbon dioxide, water spray, or foam for small fires. Use water spray, fog, or foam for large fires. Move container from fire area if this can be done without risk (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Alkaloid) Isolate hazard area and deny entry. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition it emits acrid smoke and fumes (Sax 1984, p. 2231).

NFPA Flammability Rating: Not Found

PICROTOXIN

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Hawley 1981, p. 816)

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2231)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Acrid smoke and fumes when heated to decomposition (Sax 1984, p. 2231)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in medicine as a central nervous system stimulant and antidote for barbiturate poisoning (Hawley 1981, p. 816). Reportedly, this material is not currently regarded as a useful therapeutic agent since it is not a selective respiratory stimulant (Gilman 1985, p. 585).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Alkaloid) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorities. Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PICROTOXIN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Picrotoxin is a powerful stimulant and affects all portions of the central nervous system. At doses approaching convulsant levels, signs and symptoms include salivation, elevated blood pressure, frequent vomiting, rapid breathing (Gilman 1985, p. 584).

Emergency and First Aid Procedures: (Non-Specific -- Alkaloid) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHACRYLONITRILE

CAS Registry Number: 126-98-7

Synonyms: 2-Cyano-1-Propene; 2-Cyanopropene; 2-Cyanopropene-1; 2-Methyl-2-Propenenitrile; 2-Methylacrylonitrile; 2-Methylpropenenitrile; 2-Propenenitrile, 2-Methyl-; alpha-Methacrylonitrile; alpha-Methylacrylonitrile; Isopropene Cyanide; Isopropenylnitrile; USAF ST-40

Chemical Formula: C_4H_5N

Molecular Weight: 67.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.099 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 194°F, 90.3°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.8001 at 20/4°C (*Merck 1976)

Vapor Pressure (mmHg): 40 at 12.8°C (*Clayton and Clayton 1981-82)

Melting Point: -32.4°F, -35.8°C (Merck 1983, p. 850)

Vapor Density (AIR=1): 2.31 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 2.57% by weight in water at 20°C; 2.69% by weight in water at 50°C (*Merck 1976)

METHACRYLONITRILE

SECTION II (continued)

Appearance and Odor: Colorless liquid with an odor similar to bitter almond (*Clayton and Clayton 1981-82; *Encyc Occupat Safety and Health 1971)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 1 ppm (3 mg/m^3) (skin) (*ACGIH 1986-87, p. 23)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Hawley 1977)
Skin: Yes (*Hawley 1977)
Ingestion: Yes (*Hawley 1977)

Health Hazards (Acute, Delayed, and Chronic): A lacrimator (causes tearing); an insidious poison which causes delayed skin reactions (*Merck 1976). Very readily absorbed through skin (*ACGIH 1980). Highly toxic (*Hawley 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 55°F, 13°C (*Merck 1976)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Usual precautions for flammable liquid should be applied (*Encyc Occupat Health and Safety 1971).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Methacrylonitrile evolves flammable concentrations of vapor at temperatures down to 12.8°C. Thus, at room temperatures, flammable concentrations are liable to be present. Toxic fumes are released when the material burns. Also, the chemical will explode due to its tendency to polymerize violently (*Encyc Occupat Health and Safety 1971).

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Encyc Occupat Health and Safety 1971)
Stable:

METHACRYLONITRILE

SECTION V (continued)

Conditions to Avoid: Heat (Sax 1984, p. 1795)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Toxic fumes of nitrogen oxides are formed upon heating to decomposition (Sax 1984, p. 1795).

Hazardous Polymerization: May Occur: Yes (*Encyc Occupat Health and Safety 1971)
May Not Occur:

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the preparation of homopolymers and copolymers; as intermediate in preparation of acids, amides, amines, nitriles (*Merck 1976). Also used in the manufacture of elastomers, coatings, plastics (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Methacrylonitrile cannot be detected by its smell even at concentrations which are already dangerous for humans. Hence, special attention must be given to ventilation and estimations of the amount of poison present must be carried out frequently (*Lefaux 1968).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
PVC	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for METHYLACRYLONITRILE

(126-98-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Methylacrylonitrile toxicity can occur via ingestion, dermal/eye contact, or inhalation; death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility!*

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Similar to bitter almonds (may be imperceptible at toxic levels).

Uses - Chemical intermediate; chemical manufacture of elastomers, coatings, plastics; preparation of polymers.

Materials to Avoid - Acids, water (except for use in emergency life support).

Caution: *Flammable liquid. Avoid sources of extreme heat or ignition including sparks or fire. May explosively polymerize. Unstable.*

Other Names - Alpha-methacrylonitrile; alpha-methylacrylonitrile; 2-cyanopropene; 2-cyano-1-propene; isopropene cyanide; isopropenylnitrile; 2-methylacrylonitrile; 2-methylpropenenitrile; 2-methyl-2-propenenitrile; 2-propenenitrile, 2-methyl; USAF ST-40.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), sodium bicarbonate, diazepam, phenytoin.

Signs and Symptoms of Acute Methylacrylonitrile Exposure:

Warning: *Effects, including skin reactions, may be delayed. Caution is advised. Vital signs should be monitored closely. Heart palpitation may begin within minutes after exposure.*

METHYLACRYLONITRILE

Note: Methylacrylonitrile is very readily absorbed through the skin.

Signs and symptoms of acute exposure to methylacrylonitrile may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cherry-red mucous membranes and blood, cardiac arrhythmias, and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous membranes) is not a consistent finding.

Tachypnea (rapid respiratory rate) may be followed by respiratory depression. Lung hemorrhage and pulmonary edema may also occur. Headache, vertigo (dizziness), agitation, and giddiness may be followed by combative behavior, convulsions, paralysis, protruding eyeballs, dilated and unreactive pupils, and coma.

Methylacrylonitrile is irritating to the skin and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common. Excessive salivation, nausea, and vomiting may also occur.

Emergency Life-Support Procedures:

Acute exposure to methylacrylonitrile may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methylacrylonitrile.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with methylacrylonitrile-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

METHYLACRYLONITRILE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methylacrylonitrile.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with methylacrylonitrile-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with methylacrylonitrile-contaminated persons or their gastric contents may result in self-poisoning.*

2. RUSH to a health care facility!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. DO NOT induce vomiting or attempt to neutralize!

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

METHYLACRYLONITRILE

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PYRENE

CAS Registry Number: 129-00-0

Synonyms: Benzo[d,e,f]Phenanthrene; Benzo[def]Phenanthrene; beta-Pyrene

Chemical Formula: $C_{16}H_{10}$

Molecular Weight: 202.26

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.17 mg/liter (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 5,000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 759°F, 404°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.27 at 23°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: 313°F, 156°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.135 mg/liter in water (*MacKay 1977)

Appearance and Odor: Colorless solid (Sax 1984, p. 2324); solid and solutions have a slight blue fluorescence (Merck 1983, p. 1149)

PYRENE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: TLV for coal tar pitch volatiles, as benzene solubles: TWA 0.2 mg/m^3. Coal tar pitch volatiles are suspected human carcinogens (ACGIH 1985, p. 41).

Routes of Entry: **Inhalation:** Yes (Clayton and Clayton 1981-82, p. 3361)
Skin: Yes (Hawley 1981, p. 872)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Pyrene is a carcinogenic agent and is absorbed by the skin (Hawley 1981, p. 872). It is a skin irritant, a suspected mutagen, and an equivocal tumor-causing agent (Sax 1984, p. 2324). Workers exposed to 3 to 5 mg/m^3 of pyrene exhibited some teratogenic effects (Clayton and Clayton 1981-82, p. 3361). Pyrene is a polycyclic aromatic hydrocarbon (PAH). The acute toxicity of pure PAHs appears low when administered orally or dermally to rats or mice (Encyc Occupat Health and Safety 1983, p. 1758). Human exposure to PAHs is almost exclusively via the gastrointestinal and respiratory tracts, and approximately 99 percent is ingested in the diet. Despite the high concentrations of pyrene to which humans may be exposed through food, there is currently little information available to implicate diet-derived PAHs as the cause of serious health effects (NRC 1983, p. ES-6).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2324).

NFPA Flammability Rating: Not Found

PYRENE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2324)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Biochemical research (Hawley 1981, p. 872).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED**
CPE	GOOD/LIMITED**
Neoprene	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

PYRENE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Establish open airway and respiration. If conscious, induce vomiting with syrup of ipecac. Dermal exposure should be minimized by washing the exposed surface with soap and water. Irrigate the eyes with plain tap water (*Rumack 1975 to Present).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
DOT 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Arena 1979
Gosselin 1984
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- WARFARIN SODIUM

CAS Registry Number: 129-06-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 964) Coumarin, 3-(alpha-Acetonylbenzyl)-4-Hydroxy-, Sodium Salt; 3-(alpha-Acetonylbenzyl)-4-HydroxyCoumarin Sodium Salt; Athrombin; 2H-1-Benzopyran-2-one, 4-Hydroxy-3-(3-Oxo-1-Phenylbutyl)-, Sodium Salt; Coumadin Sodium; Coumafene Sodium; Cumadin; Marevan; Marevan (Sodium Salt); Panivarfin; Panwarfin; Prothromadin; Ratsul Soluble; Sodium, ((3-(alpha-Acetonylbenzyl)-2-Oxo-2H-1-Benzopyran-4-yl) oxy)-; Sodium Coumadin; Sodium Warfarin; Tintorane; Varfine; Waran; Warcoumin; Warfarin, Sodium deriv.; Warfarin, Sodium Salt; Warfilone

Chemical Formula: $C_{19}H_{15}O_4Na$

Molecular Weight: 330.33

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 8.7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

WARFARIN SODIUM

SECTION II (continued)

Solubility in Water: Freely soluble (Merck 1983, p. 1441)

Appearance and Odor: Slightly bitter crystalline powder (Merck 1983, p. 1441)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 812)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic orally in humans (Sax 1984, p. 812).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Extinguish fires with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of sodium oxide (Sax 1984, p. 813).

NFPA Flammability Rating: Not Found

WARFARIN SODIUM

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of sodium oxide (Sax 1984, p. 812).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

(Non-Specific -- Coumarins) Anticoagulants used as rodenticides (Encyc Occupat Health and Safety 1983, p. 560)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. For small spills, take up with sand or other noncombustible absorbent material and place into containers for later disposal. For small dry spills, with clean shovel place material into clean, dry container and cover; move containers from spill area. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for WARFARIN SODIUM

(129-06-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Crystalline powder.

Odor - Slightly bitter.

Uses - Rodenticide, anticoagulant.

Other Names - 4-Hydroxy-3-(3-oxo-1-phenylbutyl)-2H-1-benzopyran-2-one, sodium salt; Warf 42.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, Vitamin K (phytonadione).

Signs and Symptoms of Acute Warfarin Sodium Exposure:

Warfarin sodium is an anticoagulant. Hemorrhage is the most common sign and may be manifested by hemorrhagic skin rashes and lip, nose, and upper airway bleeding. Upper airway pain, difficulty in speaking and swallowing, and dyspnea (shortness of breath) may occur. Vomiting, abdominal pain, and bloody stools are common. Back pain may be noted.

Emergency Life-Support Procedures:

Acute exposure to warfarin sodium may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

WARFARIN SODIUM

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to warfarin sodium.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to warfarin sodium.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

WARFARIN SODIUM

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of warfarin sodium is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM PENTACHLOROPHENATE

CAS Registry Number: 131-52-2

Synonyms: Dow Dormant Fungicide; Dowicide G; Dowicide G-ST; Mystox D; Napclor-G; PCP Sodium Salt; PCP-Sodium; Pentachlorophenate Sodium; Pentachlorophenol Sodium Salt; Pentachlorophenol, Sodium Salt; Pentachlorophenoxy Sodium; Pentaphenate; Phenol, Pentachloro-, Sodium Salt; PKHFN; Santobrite; SAPCO 25; Sodium PCP; Sodium Pentachlorophenol; Sodium Pentachlorophenolate; Sodium Pentachlorophenoxide; Sodium Pentachlorphenate; Sodium, (Pentachlorophenoxy)-; Weedbeads

Chemical Formula: C_6Cl_5ONa

Molecular Weight: 288.30

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.24 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

SODIUM PENTACHLOROPHENATE

SECTION II (continued)

Solubility in Water: 330 g/L at 25°C (*Worthing 1979); 21.0 % wt/vol at 5°C; 29.0% wt/vol at 40°C (*Clayton and Clayton 1981-82)

Appearance and Odor: Tan powder (*Sax 1975); powder, pellets, and briquettes (*Hawley 1977) with a phenolic odor (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Clayton and Clayton 1981-82)
Skin: Yes (*Clayton and Clayton 1981-82)
Ingestion: Yes (*Clayton and Clayton 1981-82)

Health Hazards (Acute, Delayed, and Chronic): Fine dusts and sprays are irritating to the eyes and upper respiratory tract. Severe intoxications, including fatalities, have been reported from uncontrolled use. This compound causes inflamed gastric mucosa, congestion of the lungs, edema in the brain, cardiac dilatation, degeneration of the liver and kidneys (*Encyc Occupat Health and Safety 1971).

Medical Conditions Generally Aggravated by Exposure: Individuals suffering from kidney and liver diseases have a lowered resistance and should not be exposed (*Clayton and Clayton 1981-82).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: It is noncombustible (Student 1981, p. 394). For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Wear self-contained (positive pressure) breathing apparatus and full protective clothing. Move container from fire area if possible. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

SODIUM PENTACHLOROPHENATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorides and sodium oxide (Sax 1984, p. 2446).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Wood preservative (*SRI); preservation of cellulose products, textiles, paints, adhesives, leather, pulp, paper and industrial waste systems (*Clayton and Clayton 1981-82); contact and pre-emergence herbicide (*Farm Chemicals Handbook 1981); general disinfectant (*Worthing 1979) and control of the intermediate snail host of schistosomiasis (Buchel 1983, p. 220)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill. Collect spilled material in most convenient manner and deposit in sealed containers for later disposal. Liquids should be absorbed in vermiculite, dry sand, earth, or similar material (*NIOSH/OSHA 1981). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SODIUM PENTACHLOROPHENATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Exposure to fine dusts or sprays cause burning in eyes and painful irritation in upper respiratory tract. If inhaled, it will induce violent coughing and sneezing. Skin irritation results from brief exposures (*Clayton and Clayton 1981-82). Symptoms of severe systemic intoxication include loss of appetite, respiratory difficulties, anesthesia, fever, sweating, difficulty in breathing and rapidly progressive coma (*Encyc Occupat Health and Safety 1971).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site (DOT 1984, Guide 53). Bathe and shampoo with soap and water. Flush chemicals from eyes with copious amounts of water. Prevent absorption. If the material is ingested, the stomach must be emptied (*Morgan 1976).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZYL CYANIDE

CAS Registry Number: 140-29-4

Synonyms: (Cyanomethyl)Benzene; 2-Phenylacetonitrile; Acetic acid, Phenyl-Nitrile; Acetonitrile, Phenyl-; alpha-Cyanotoluene; alpha-Tolunitrile; Benzeneacetonitrile; Benzyl Nitrile; omega-Cyanotoluene; Phenylacetonitrile; Toluene, alpha-Cyano; USAF KF-21

Chemical Formula: C_8H_7N

Molecular Weight: 117.14

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.43 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 451.4°F, 233.5°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.0214 at 15°C (*Merck 1976)

Vapor Pressure (mmHg): 1 at 60°C (*Sax 1979)

Melting Point: -10.8°F, -23.8°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Weast 1979)

Appearance and Odor: Benzyl cyanide is a colorless, oily liquid with an aromatic odor (*Hawley 1977; *Merck 1976)

BENZYL CYANIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2171)
Skin: Yes (Hawley 1981, p. 122)
Ingestion: Yes (Sax 1984, p. 2171)

Health Hazards (Acute, Delayed, and Chronic): Poisonous. May be fatal if inhaled, swallowed, or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of cyanide and nitrogen oxides (Sax 1984, p. 2171). Container may explode in heat of fire. Runoff from fire control water may give off poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

BENZYL CYANIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Sodium hypochlorite (Sax 1984, p. 2171)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of cyanide and nitrogen oxides (Sax 1984, p. 2171).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Organic synthesis, especially penicillin precursors (*Hawley 1977). Chemical intermediate for amphetamines, phenobarbital, the stimulant, methyl phenidylacetate, esters as perfumes and flavors (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing vapors (see Section III above). Do not touch spilled materials; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for BENZYL CYANIDE

(140-29-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless, oily liquid.

Odor - Aromatic.

Commercial Form - Liquid in metal drums, tins, or bottles.

Uses - Manufacture of pharmaceuticals, penicillin, perfumes, and flavors.

Material to Avoid - Water (except for use in emergency life support).

Caution: *Avoid sources of heat including fire. Benzyl cyanide will liberate toxic fumes of cyanide and nitrogen oxides when heated to decomposition.*

Other Names - Benzeneacetonitrile, benzyl nitrile, (cyanomethyl) benzene, phenylacetonitrile, alpha-tolunitrile, USAF KF-21.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), sodium bicarbonate, diazepam, phenytoin.

Signs and Symptoms of Acute Benzyl Cyanide Exposure:

Warning: *Benzyl cyanide may be fatal if inhaled, swallowed, or absorbed through skin or mucous membranes. Caution is advised.*

Signs and symptoms of acute exposure to benzyl cyanide may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cherry-red or bloody mucous membranes may be noted. Cardiac arrhythmias and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous membranes) may be observed.

BENZYL CYANIDE

Headache, vertigo (dizziness), agitation, and giddiness may be followed by combative behavior, convulsions, paralysis, protruding eyeballs, dilated and unreactive pupils, and coma. Tachypnea (rapid, shallow respirations) or hyperpnea (rapid, deep respirations) may be followed by respiratory depression. Lung hemorrhage and pulmonary edema may also occur.

Benzyl cyanide is irritating to the skin, eyes, and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common. Salivation, nausea, and vomiting may also occur.

Emergency Life-Support Procedures:

Acute exposure to benzyl cyanide may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to benzyl cyanide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with benzyl cyanide-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to benzyl cyanide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

BENZYL CYANIDE

Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with benzyl cyanide-contaminated persons or their gastric contents can result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with benzyl cyanide-contaminated persons or their gastric contents can result in self-poisoning.*

2. RUSH to a health care facility!

3. DO NOT induce vomiting or attempt to neutralize!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PYRIDINE, 2-METHYL-5-VINYL-

CAS Registry Number: 140-76-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 423): 2-Methyl-5-Ethenylpyridine; Pyridine, 5-Ethenyl-2-Methyl-; 2-Methyl-5-Vinylpyridine; 2-Picoline, 5-Vinyl-

Chemical Formula: C_8H_9N

Molecular Weight: 119.18

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.189 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 358°F, 181°C (Hawley 1981, p. 692)

Specific Gravity (H_2O=1): 0.978-0.982 20°C/20°C (Hawley 1981, p. 692)

Vapor Pressure (mmHg): Not Found

Melting Point: Freezing point: 6.3°F, -14.3°C (anhydrous) (Hawley 1981, p. 692)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Clear to faintly opalescent liquid (Hawley 1981, p. 692)

PYRIDINE, 2-METHYL-5-VINYL-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1944)
Skin: Yes (Sax 1984, p. 1944)
Ingestion: Yes (Sax 1984, p. 1944)

Health Hazards (Acute, Delayed, and Chronic): This material is moderately toxic by ingestion, inhalation, and absorption through the skin (Sax 1984, p. 1944).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 165°F, 73.9°C (TOC) (Hawley 1981, p. 692)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: It is combustible (Hawley 1981, p. 692). (Non-Specific -- Combustible Liquid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 27).

Special Fire Fighting Procedures: (Non-Specific -- Combustible Liquid, n.o.s.) Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. 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 (DOT 1984, Guide 27).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1944). (Non-Specific -- Combustible Liquid, n.o.s.) 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 (DOT 1984, Guide 27).

NFPA Flammability Rating: Not Found

PYRIDINE, 2-METHYL-5-VINYL-

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxide (Sax 1984, p. 1944).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a monomer for resins; oil additive, ore flotation agent; and dye acceptor (Hawley 1981, p. 692).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Combustible Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking, or flames in hazard area. Stop leak if you can do so without risk. Use water spray to reduce vapors. Absorb spills with sand or noncombustible absorbent material. For large spills dike far ahead (DOT 1984, Guide 27).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Combustible Liquid, n.o.s.) Vapors may cause dizziness or suffocation (DOT 1984, Guide 27).

Emergency and First Aid Procedures: (Non-Specific -- Combustible Liquid, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give

SECTION IX (continued)

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 (DOT 1984, Guide 27).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Weast 1979
Merck 1983
Student 1981
CHRIS 1978
Doull 1980
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985
Clayton and Clayton 1981-82
NFPA 1984
Weiss 1980

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DICROTOPHOS

CAS Registry Number: 141-66-2

Synonyms: 3-(Dimethoxyphosphinyloxy)-N,N-Dimethyl-cis-Crotonamide; 3-(Dimethylamino)-1-Methyl-3-Oxo-1-Propenyl Dimethyl Phosphate (E)-Isomer; 3-Dimethoxyphosphinyloxy-N,N-Dimethylisocrotonamide; 3-Hydroxy-N,N-Dimethyl-cis-Crotonamide Dimethyl Phosphate; 3-Hydroxydimethyl Crotonamide Dimethyl Phosphate; Bidrin; C 709; Carbicron; Carbomicron; Ciba 709, Cis-2-Dimethylcarbamoyl-1-Methylvinyl Dimethylphosphate; Crotonamide, 3-Hydroxy-N,N-Dimethyl-, cis-, Dimethyl Phosphate; Dimethyl (E)-2-Dimethyl-Carbamoyl-1-Methylvinyl Phosphate; Dimethyl 1-Dimethylcarbamoyl-1-Propen-2-yl Phosphate; Dimethyl 2-Dimethylcarbamoyl-1-Methylvinyl Phosphate; Phosphoric Acid, Dimethyl Ester, Ester with cis-3-Hydroxy-N,N-Dimethylcrotonamide; Dimethyl Phosphate Ester with 3-Hydroxy-N,N-Dimethylcrotonamide; Dimethyl Phosphate of 3-Hydroxy-N,N-Dimethyl-cis-Crotonamide; Ektafos; ENT 24,482; Karbicron; O,O-Dimethyl O-(N,N-Dimethylcarbamoyl-1-Methylvinyl) Phosphate; O,O-Dimethyl O-(1,4-Dimethyl-3-Oxo-4-Azapent-1-enyl) Phosphate; Oleobidrin; Phosphoric acid, Dimethyl Ester, Ester with (E)-3-Hydroxy-N,N-Dimethyl-crotonamide; SD 3562; Shell SD-3562; Phosphoric Acid, 3-(Dimethylamino)-1-Methyl-3-oxo-1- Propenyl Dimethyl Ester, (E)-; Crotonamide, 3-Hydroxy-N,N-Dimethyl-, Dimethyl Phosphate, cis-; Crotonamide, 3-Hydroxy-N,N-Dimethyl-, Dimethyl Phosphate, (E)-

Chemical Formula: $C_8H_{16}NO_5P$

Molecular Weight: 237.21

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.09 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 752°F, 400°C (*Merck 1976)

DICROTOPHOS

SECTION II (continued)

Specific Gravity (H_2O=1): 1.216 at 15°C/15°C (*Merck 1976)

Vapor Pressure (mmHg): 0.00001 at 20°C (Worthing 1983, p. 190)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Sax 1979)

Appearance and Odor: Dicrotophos is a yellow to brown liquid with a mild ester odor (*Spencer 1973; *Worthing 1979).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.25 mg/m^3 (skin) (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hayes 1982, pp. 361-362)
Skin: Yes (Hayes 1982, pp. 361-362)
Ingestion: Yes (Hayes 1982, pp. 361-362)

Health Hazards (Acute, Delayed, and Chronic): It is extremely toxic. Probable human oral lethal dose is 5 to 50 mg/kg, 7 drops to one teaspoonful for a 70 kg (150 lb.) person. Closely related in toxicity to azodrin (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Above 175°F (*Farm Chemicals Handbook 1981)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water

DICROTOPHOS

SECTION IV (continued)

for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Keep away from heat and open flame (*Farm Chemicals Handbook 1981).

Incompatibility (Materials to Avoid): Rapidly hydrolyzes in acid or alkali (*Sunshine 1969).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used to control sucking, boring, and chewing pests on rice, cotton, coffee, apples, and other crops. Effective on ornamentals, trees, and shrubs for aphids, leaf hoppers, and scale insects (*Worthing 1979; *Spencer 1973; *SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

DICROTOPHOS

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DICROTOPHOS

(141-66-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Yellow liquid.

Odor - Esterlike.

Commercial Form - Brown, aqueous solution.

Use - Pesticide.

Materials to Avoid - Acids, alkali.

Other Names - Bidrin, Carbicron, Carbomicron, Ektafos, Karbicron, 3-(dimethyoxyphosphinyloxy)-N,N-dimethyl-cis-crotonamide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Dicrotophos Exposure:

Note: Dicrotophos is a cholinesterase inhibitor.

Acute exposure to dicrotophos may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

DICROTOPHOS

Emergency Life-Support Procedures:

Acute exposure to dicrotophos may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to dicrotophos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to dicrotophos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

DICROTOPHOS

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of dicrotophos is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of dicrotophos may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM CYANIDE (Na(CN))

CAS Registry Number: 143-33-9

Synonyms: Cyanide of Sodium; Cyanogran; Cymag; Hydrocyanic Acid, Sodium salt; Sodium Cyanide, Solid (DOT)

Chemical Formula: NaCN

Molecular Weight: 49.01

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (domestic animal) 4 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): In Cyanide Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 2725°F, 1496°C (*Weast 1979)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 1 at 817°C (*Clayton and Clayton 1981-82)

Melting Point: 1047°F, 564°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 82 g/100 cc at 35°C (*Weast 1979)

Appearance and Odor: White solid in form of granules, flakes, or eggs (resembling chicken eggs) (*NFPA 1978); colorless cubes (*Weast 1979); odorless when perfectly dry but emits odor of hydrogen cyanide when damp (*Merck 1983)

SODIUM CYANIDE (Na(CN))

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 mg (Cyanide)/m^3 (Skin) (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 5 mg (Cyanide)/m^3 (*ACGIH 1983)

IDLH: 50 mg/m^3 (NIOSH/OSHA 1978, p. 74)

Other Limits Recommended: The recommended upper limit for occupational exposure to cyanide salts is 5 mg (Cyanide)/m^3/10 min (*NIOSH/RTECS 1985).

Routes of Entry: **Inhalation:** Yes (*Clayton and Clayton 1981-82)
Skin: Yes (*Clayton and Clayton 1981-82)
Ingestion: Yes (*Clayton and Clayton 1981-82)

Health Hazards (Acute, Delayed, and Chronic): Super toxic; probable oral lethal dose in humans is less than 5 mg/kg or a taste (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976). Sodium cyanide is poisonous and may be fatal if inhaled, swallowed or absorbed through the skin. Contact with sodium cyanide may cause burns to skin and eyes (*DOT 1984).

Medical Conditions Generally Aggravated by Exposure: Individuals with chronic diseases of the kidneys, respiratory tract, skin, or thyroid are at greater risk of developing toxic cyanide effects (*Encyc Occupat Health and Safety 1983).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not combustible (NFPA 1984, p. 49-81)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use water (*NFPA 1978). Use dry chemical, carbon dioxide, water spray, or foam for small fires, water spray, fog, or foam for large fires (*DOT 1984).

Special Fire Fighting Procedures: Full protective clothing including self-contained breathing apparatus, rubber gloves, boots, and bands around legs, arms, and waist should be provided. No skin surface should be exposed. Normal fire fighting procedures may be used (*NFPA 1978). Fight fire from maximum distance. Move container from area if you can do it without risk. Dike fire control water for later disposal. Do not scatter the material (*DOT 1984).

Unusual Fire and Explosion Hazards: Sodium cyanide is not combustible itself, but contact with acids releases highly flammable hydrogen cyanide gas (*NFPA 1978). Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Container may explode in the heat of fire (*DOT 1984).

NFPA Flammability Rating: 0

SODIUM CYANIDE (Na(CN))

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Avoid contact with acids (*NFPA 1978). Aqueous solutions rapidly decompose (*Hawley 1977).

Incompatibility (Materials to Avoid): Strong oxidizers such as nitrates and chlorates; acids and acid salts (NIOSH/OSHA 1978, p. 74)

Hazardous Decomposition or Byproducts: Hydrogen cyanide (*NFPA 1978)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Sodium cyanide is used as a fumigant (*Merck 1983), a rodenticide (*Morgan 1982), in cleaning metals, and in the manufacturing of dyes and pigments, as a chelating compound (*Hawley 1977), as a component of electroplating solutions, as a component of salts for case hardening steel, and as an agent for extraction of gold and silver from ores (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Evacuate the area immediately (*Encyc Occupat Health and Safety 1983). Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for SODIUM CYANIDE

(143-33-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Sodium cyanide toxicity can occur via ingestion, dermal/eye contact, or inhalation; death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility!*

Substance Characteristics:

Pure Forms - White deliquescent, crystalline powder.

Odor - None when dry; bitter, almondlike when damp.

Commercial Forms - White granules, flakes, or eggs in carboys.

Uses - Metal cleaning, electroplating, steel hardening, chelation, gold and silver extraction; fumigant, rodenticide, dyes.

Materials to Avoid - Acids.

Other Names - Cyanogran; Cymag; hydrocyanic acid, sodium salt.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate, cyanide antidote kit (amyl nitrite ampule, sodium nitrite, sodium thiosulfate), activated charcoal, saline cathartic or sorbitol, sodium bicarbonate, diazepam, phenytoin.

Signs and Symptoms of Acute Sodium Cyanide Exposure:

Warning: *Heart palpitations may occur within minutes after exposure. Caution is advised. Effects may be delayed.*

Signs and symptoms of acute exposure to sodium cyanide may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cardiac arrhythmias and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous membranes) and cherry-red or bloody mucous membranes may occur.

SODIUM CYANIDE

Tachypnea (rapid respiratory rate) may be followed by respiratory depression. Pulmonary edema and lung hemorrhage may also occur. Headache, vertigo (dizziness), agitation, and giddiness may be followed by combative behavior, dilated and unreactive pupils, convulsions, paralysis, and coma.

Sodium cyanide is irritating to the skin and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common. Increased salivation, nausea, and vomiting are often seen.

Emergency Life-Support Procedures:

Acute exposure to sodium cyanide may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to sodium cyanide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with sodium cyanide-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to sodium cyanide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

SODIUM CYANIDE

Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with sodium cyanide-contaminated persons or their gastric contents may result in self-poisoning.*

3. RUSH to a health care facility!

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. Wash exposed skin areas twice with soap and water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.

   Warning: *To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with sodium cyanide-contaminated persons or their gastric contents may result in self-poisoning.*

2. RUSH to a health care facility!

3. DO NOT induce vomiting. Ipecac is not recommended for ingestion of sodium cyanide.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIMETHYLOLPROPANE PHOSPHITE

CAS Registry Number: 824-11-3

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 298) 1,3-Propanediol, 2-Ethyl-2-(Hydroxymethyl)-, Cyclic Phosphite (1:1); 4-Ethyl-1-Phospha-2,6,7-Trioxabicyclo[2.2.2]Octane; 4-Ethyl-2,6,7-Trioxa-1-Phosphabicyclo[2.2.2]Octane; 2-(Hydroxymethyl)-2-Ethyl-1,3-Propanediol, Cyclic Phosphite (1:1); 1,1,1-Tris-hydroxymethylpropane Bicyclic Phosphite

Chemical Formula: $C_6H_{11}O_3P$

Molecular Weight: 162.14

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 2.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

TRIMETHYLOLPROPANE PHOSPHITE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

TRIMETHYLOLPROPANE PHOSPHITE

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENT

Sources searched but no information found:

Clayton and Clayton 1981-82
Weast 1979
Verschueren 1983
Merck 1983
Sax 1984
Student 1981
NFPA 1984
Gosselin 1984
Hayes 1982

EPA CHEMICAL PROFILE

Date: June 22, 1987
Revision: November 30, 1987

CHEMICAL IDENTITY -- STANNANE, ACETOXYTRIPHENYL-

CAS Registry Number: 900-95-8

Synonyms: Acetatotriphenylstannane; Acetoxy-triphenylstannane; (Acetyloxy)triphenylstannane; Acetoxytriphenylstannane; Acetoxytriphenyltin; Acetyloxytriphenylstannane; Batasan; Brestan; Brestan 60; ENT 25208; Fenolovo Acetate; Fentin Acetate; GC 6936; HOE-2824; Liromatin; Lirostanol; Phentinoacetate; Phentin Acetate; Stannane, (Acetyloxy)Triphenyl-; Suzu; Tin, Acetoxytriphenyl-; Tinestan; Tinestan 60 WP; Tin Triphenyl Acetate; TPTA; TPZA; Triphenylaceto Stannane; Triphenyltin Acetate; Tubotin; VP 1940; VP 19-40

Chemical Formula: $C_{20}H_{18}O_2Sn$

Molecular Weight: 409.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 21 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.55 at 20°C (*Hartley and Kidd 1983)

Vapor Pressure (mmHg): 0.000000014 (1.9 uPa) at 60°C (*Worthing 1983)

Melting Point: 252°F, 122°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 9 mg/liter at 20°C (*Worthing 1983)

STANNANE, ACETOXYTRIPHENYL-

SECTION II (continued)

Appearance and Odor: Colorless (*Worthing 1983) to white crystalline solid (*Hawley 1981) to small needles (*Merck 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Tin, organic compounds) 0.1 mg/m^3, as tin (NIOSH 1987, p.224)

ACGIH TLV: (Tin, organic compounds) 0.1 mg/m^3, as tin (skin) (ACGIH 1986-87)

IDLH: Not Found

Other Limits Recommended: IDLH for tin organic compounds 200 mg/m^3, as tin (NIOSH 1987, p. 224). NIOSH: (Tin organic compounds) 10.1 mg/m^3 (as tin) 10 hour TWA (NIOSH 1987, p. 224).

Routes of Entry: **Inhalation:** Yes (*Gosselin 1984)
Skin: Yes (*Rumack 1975-Present)
Ingestion: Yes (*Weast 1983-84)

Health Hazards (Acute, Delayed, and Chronic): Very toxic (*Weast 1983-84); irritant to skin (*Hawley 1981).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found

Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organotin pesticide, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organotin pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

STANNANE, ACETOXYTRIPHENYL-

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1983)

Conditions to Avoid: Air, light (*Worthing 1983), and moisture (*Spencer 1973)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an antifeeding compound for insect pest control, a fungicide (*Merck 1983), an algicide, and a molluscicide (*Farm Chemicals Handbook 1981).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organotin pesticide, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include severe headache, nausea, vomiting and abdominal pain. There may be sugar in the urine

STANNANE, ACETOXYTRIPHENYL-

SECTION IX (continued)

and high blood sugar. Dizziness and loss of consciousness may occur (*Gosselin 1984).

Emergency and First Aid Procedures: (Non-Specific -- Organotin pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DEMETON-S-METHYL

CAS Registry Number: 919-86-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 158) Phosphorothioic Acid, S-(2-(Ethylthio)Ethyl) O,O-Dimethyl Ester; BAY 18436; Bayer 25/154; O,O-Dimethyl S-(2-Eththioethyl) Phosphorothioate; Dimethyl S-(2-Eththioethyl) Thiophosphate; O,O-Dimethyl S-(Ethylmercapto)ethyl Thiophosphate; O,O-Dimethyl 2-Ethylmercaptoethyl Thiophosphate, Thiolo Isomer; O,O-Dimethyl S-(2-(Ethylthio)Ethyl) Phosphorothioate; Isometasystox; Isomethylsystox; Ethanethiol, 2-(Ethylthio)-, S-Ester with O,O-Dimethyl Phosphorothioate; S-(2-(Ethylthio)Ethyl) O,O-Dimethyl Phosphorothioate; S-(2-(Ethylthio)Ethyl) Dimethyl Phosphorothiolate; S-(2-(Ethylthio)Ethyl) O,O-Dimethyl Thiophosphate; Metaisoseptox; Metaisosystox; Metasystox Forte; Metasystox (I); Metasystox J; Methyl Demeton Thioester; Methyl Isosystox; Methyl-Mercaptofos Teolovy; Phosphorothioic Acid, O,O-Dimethyl S-(2-(Ethylthio)Ethyl) Ester

Chemical Formula: $C_6H_{15}O_3PS_2$

Molecular Weight: 230.30

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.5 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 192°F, 89°C at 0.15 mmHg (Merck 1983, p. 867)

Specific Gravity (H_2O=1): 1.207 at 20°C/4°C (Merck 1983, p. 867)

Vapor Pressure (mmHg): 0.00036 at 20°C (Worthing 1979, p. 155)

DEMETON-S-METHYL

SECTION II (continued)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (3300 ppm) (Merck 1983, p. 867)

Appearance and Odor: Pale yellow oil (Merck 1983, p. 867)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 865)
Skin: Yes (Sax 1984, p. 865)
Ingestion: Yes (Sax 1984, p. 865)

Health Hazards (Acute, Delayed, and Chronic): It inhibits the nervous system and is absorbed readily through the skin (Merck 1983, p. 867). This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 66). Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 66). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 66). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive

DEMETON-S-METHYL

SECTION IV (continued)

pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of oxides of phosphorus and sulfur (Sax 1984, p. 865). This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 66). This material may burn but does not ignite readily. Container may explode in heat of fire. Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Hydrolyzed by alkali (Hayes 1982, p. 341)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of oxides of phosphorus and sulfur (Sax 1984, p. 865).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is an insecticide (Merck 1983, p. 867). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 66). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

DEMETON-S-METHYL

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DEMETON-S-METHYL

(919-86-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Pale yellow oil.

Use - Insecticide.

Other Names - Methylsystox, methyl-mercaptophos, O,O-dimethyl S-(ethylmercapto)ethyl thiophosphate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Demeton-S-Methyl Exposure:

Warning: *Demeton-s-methyl is readily absorbed through the skin.*

Note: Demeton-s-methyl is a cholinesterase inhibitor.

Acute exposure to demeton-S-methyl may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

DEMETON-S-METHYL

Emergency Life-Support Procedures:

Acute exposure to demeton-S-methyl may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to demeton-S-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to demeton-S-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Emergency First Aid Treatment Guide for DEMETON-S-METHYL

(919-86-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Pale yellow oil.

Use - Insecticide.

Other Names - Methylsystox, methyl-mercaptophos, O,O-dimethyl S-(ethylmercapto)ethyl thiophosphate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Demeton-S-Methyl Exposure:

Warning: *Demeton-s-methyl is readily absorbed through the skin.*

Note: Demeton-s-methyl is a cholinesterase inhibitor.

Acute exposure to demeton-S-methyl may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

DEMETON-S-METHYL

Emergency Life-Support Procedures:

Acute exposure to demeton-S-methyl may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to demeton-S-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to demeton-S-methyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

DEMETON-S-METHYL

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of demeton-s-methyl is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of demeton-s-methyl may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHACRYLOYL CHLORIDE

CAS Registry Number: 920-46-7

Synonyms: (SANSS 1983 Synonyms): 2-Propenoyl Chloride, 2-Methyl-; Methacryl Chloride; Methacrylic Acid Chloride; Methacrylic Chloride; Methacrylyl Chloride; Methylacryloyl Chloride

Chemical Formula: C_4H_5ClO

Molecular Weight: 105

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.06 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 205°F, 96°C (Weast 1983, p. C-371)

Specific Gravity (H_2O=1): 1.0871 at 20°C/4°C (Weast 1983, p. C-371)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

METHACRYLOYL CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

METHACRYLOYL CHLORIDE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
Sax 1984
DOT 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985
Verschueren 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FONOFOS

CAS Registry Number: 944-22-9

Synonyms: Phosphonodithioic Acid, Ethyl-, O-Ethyl S-Phenyl Ester; Dyphonate; Difonate; Difonatul; Dyfonat; Dyfonate; Ethylphosphonodithioic Acid O-Ethyl S-Phenyl Ester; Fonofos; O-Ethyl S-Phenyl Ethyldithiophosphonate; O-Ethyl S-Phenyl Ethylphosphonothiolothionate; Phosphonodithioic Acid, Ethyl-, O-Ethyl S-Phenyl Ester; ENT 25,796; N 2790; N-2790; Stauffer N 2790

Chemical Formula: $C_{10}H_{15}OPS_2$

Molecular Weight: 246.32

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (domestic animal) 1.3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 266°F, 130°C at 0.1 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): 1.16 at 25°C (*Merck 1976)

Vapor Pressure (mmHg): 0.00021 at 25°C (*Worthing 1979)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 13 ppm at 22°C (*Spencer 1973)

FONOFOS

SECTION II (continued)

Appearance and Odor: Light yellow liquid (*Merck 1976); pungent mercaptan-like odor (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 mg/m^3 (skin) (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organic Phosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): This material is a cholinesterase inhibitor (*Merck 1976). It can cause severe symptoms and death from respiratory arrest (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 82). Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 82). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When this material is heated to decomposition, it can emit highly toxic fumes of phosphorus oxides (*Sax 1979).

NFPA Flammability Rating: Not Found

FONOFOS

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated it can emit highly toxic fumes of phosphorus oxides (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used primarily as an insecticide for corn (*Spencer 1973).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 82). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

FONOFOS

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, vertigo, sensation of tightness in chest, blurring of vision, ocular pain, loss of muscle coordination, slurring in speech, muscle twitching, drowsiness, excessive secretion of respiratory tract mucous, and convulsions (*Gosselin 1976).

Emergency and First Aid Procedures: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 82). Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSFOLAN

CAS Registry Number: 947-02-4

Synonyms: Imidocarbonic Acid, Phosphonodithio-, Cyclic Ethylene P,P-Diethyl Ester; Cyolane; (Diethoxyphosphinyl)Dithioimidocarbonic Acid Cyclic Ethylene Ester; 1,2-Ethanedithiol, Cyclic Ester with P,P-Diethyl Phosphonodithioimidocarbonate; 1,2-Ethanedithiol, Cyclic S,S-Ester with Phosphonodithioimidocarbonic Acid P,P-Diethyl Ester; 2-(Diethoxy-phosphinylimino)-1,3-Dithiolane; AC 47031; American Cyanamid CL-47031; American Cyanamide 47031; Cayolan; CL 47031; CL-47031; Cyalane; Cyclic Ethylene(Diethoxyphosphinothioyl) Dithioimidocarbonate; Cylan; Cyolan; Cyolane Insecticide; EI 47301; ENT 25,830; Imidocarbonic Acid, (Diethoxyphosphinyl) Dithio-, Cyclic Ethylene Ester; Imidocarbonic Acid, Phosphonodithio-, P,P-Diethyl Cyclic Ethylene Ester; P,P-Diethyl Cyclic Ethylene Ester of Phosphonodithioimidocarbonic Acid; Phosphoramidic Acid, 1,3-Dithiolan-2-ylidene-, Diethyl Ester

Chemical Formula: $C_7H_{14}NO_3PS_2$

Molecular Weight: 255.3

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Llsted (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 239-244.4°F, 115-118°C at 0.001 mmHg
(*Worthing 1979)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

PHOSFOLAN

SECTION II (continued)

Melting Point: 98.6-113°F, 37-45°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Worthing 1979)

Appearance and Odor: Colorless to yellow solid (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Similar to parathion. Death may result due to respiratory arrest as a result of paralysis of respiratory muscles and intense bronchoconstriction (*Gosselin 1976). Also considered a cholinesterase inhibitor (*Soliman 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, foam, or fog (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire (DOT 1984, Guide 55). When heated to

PHOSFOLAN

SECTION IV (continued)

decomposition, it emits very toxic fumes of oxides of phosphorus, sulfur, and nitrogen (Sax 1984, p. 2210).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Hydrolyzed by alkalies (*Worthing 1979)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of oxides of phosphorus, sulfur, and nitrogen (Sax 1984, p. 2210).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide (*Farm Chemicals Handbook 1981)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Keep unnecessary people away. Do not touch spilled material. Use water spray to reduce vapors. Take up spills with noncombustible absorbent materials. Small dry spills: with clean shovel place material into clean, dry container and cover; move container from spill area. For large spills dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PHOSFOLAN

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms similar to parathion and include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, dizziness, weakness, tightness in the chest, blurring or dimness of vision, tearing, loss of muscle coordination, slurring of speech, twitching of muscles, drowsiness, difficulty in breathing, respiratory rales, and random jerky movements (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MEPHOSFOLAN

CAS Registry Number: 950-10-7

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 177) 1,3-Dithiolane, 2-(Diethoxyphosphinylimino)-4-Methyl-; AC 47470; Cyclic Propylene (Diethoxyphosphinyl)Dithioimidocarbonate; Cytrolane; 2-(Diethoxyphosphinylimino)-4-Methyl-1,3-Dithiolane; P,P-Diethyl Cyclic Propylene Ester of Phosphonodithioimidocarbonic Acid; Diethyl (4-Methyl-1,3-Dithiolan-2-ylidene) Phosphoroamidate; EI-47470; ENT-25,991

Chemical Formula: $C_8H_{16}NO_3PS_2$

Molecular Weight: 269.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 248°F, 120°C at 0.001 mmHg (Merck 1983, p. 835)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 57 g/kg at 25°C (Merck 1983, p. 835)

MEPHOSFOLAN

SECTION II (continued)

Appearance and Odor: Yellow to amber liquid (Merck 1983, p. 835)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organic Phosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Sax 1984, p. 980)
Ingestion: Yes (Sax 1984, p. 980)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic if swallowed or absorbed through the skin (Sax 1984, p. 980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organic Phosphate, Liquid) Use agent suitable for surrounding fire. Use water in flooding quantities as fog. Use foam, carbon dioxide, or dry chemical (Student 1981, p. 381).

Special Fire Fighting Procedures: (Non-Specific -- Organic Phosphate, Liquid) Use water spray to absorb vapors. Avoid breathing vapors. Keep upwind. Wear self-contained breathing apparatus. Avoid bodily contact with the material. Wear full protective clothing (Student 1981, p. 381).

Unusual Fire and Explosion Hazards: When heated to decomposition, this material emits very toxic fumes of nitrogen oxides, phosphorus oxides and sulfur oxides (Sax 1984, p. 980).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (at neutral pH) (Merck 1983, p. 835)

MEPHOSFOLAN

SECTION V (continued)

Conditions to Avoid: Hydrolyzed by acid or alkali (Merck 1983, p. 835)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Nitrogen oxides, phosphorus oxides, and sulfur oxides are emitted when this material is heated to decomposition (Sax 1984, 980).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is an insecticide and acaricide (Merck 1983, p. 835). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organic Phosphate, Liquid) Use water spray to knock down vapors. Build dikes to contain material as necessary. Avoid breathing vapors. Keep upwind. Avoid bodily contact with the material. Downwind evacuation should be considered (Student 1981, p. 381).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

MEPHOSFOLAN

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Organic Phosphorus Pesticides) Signs and symptoms include headache, giddiness, nervousness, blurred vision, weakness, nausea, vomiting, cramps, diarrhea, and discomfort in the chest. In severe cases there may be convulsions, coma, loss of reflexes, and loss of sphincter control (Hayes 1982, p. 301).

Emergency and First Aid Procedures: Treat immediately. (Non-Specific -- Organic Phosphorus Pesticide) If this material has been ingested or inhaled, and the patient is conscious, induce vomiting, give milk or water, and induce vomiting again. If there has been skin contact, wash contacted areas with soap and water followed by alcohol. If there has been eye contact, irrigate with water (Hayes 1982, p. 313).

COMMENT

Sources searched but no information was found:

Clayton and Clayton 1981-82
Weast 1979
Verschueren 1983
Gosselin 1984
Buschel 1983
Farm Chemicals Handbook 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHIDATHION

CAS Registry Number: 950-37-8

Synonyms: Phosphorodithioic Acid, O,O-Dimethyl Ester, S-Ester with 4-(Mercaptomethyl)-2-Methoxy-delta(sup2)-1,3,4-Thiadiazolin-5-one; Supracide; (O,O-Dimethyl) S-(2-Methoxy-delta(sup2)-1,3,4-Thiadiazolin-5-on-4-ylmethyl) Dithiophosphate; DMTP; ENT 27193; Geigy 13005; Geigy GS-13005; GS 13005; Medathion; O,O-Dimethyl S (5-Methoxy-1,3,4-Thiadiazolinyl-3-Methyl) Dithiophosphate; O,O-Dimethyl S-(2-Methoxy-1,3,4,-Thiadiazol-5(4H)-onyl-(4)-Methyl)Phosphorodithioate; Phosphorodithioic Acid, O,O-Dimethyl Ester, S-Ester with 4-(Mercaptomethyl)-2-Methoxy-delta(sup2)-1,3,4-Thiadiazolin-5-one; Phosphorodithioic Acid, S-[(5-Methoxy-2-Oxo-1,3,4-Thiadiazol-3(2H)-yl)Methyl) O,O-Dimethyl Ester; S-(2,3-Dihydro-5-Methoxy-2-Oxo-1,3,4-Thiadiazol-3-Methyl) Dimethyl Phosphorothiolothionate; S-2,3-Dihydro-5-Methoxy-2-Oxo-1,3,4-Thiadiazol-3-ylmethyl O,O-Dimethyl Phosphorodithioate; S-[(5-Methoxy-2-Oxo-1,3,4-Thiadiazol-3(2H)-yl)Methyl] O,O-Dimethyl Phosphorodithioate; Somonil; Supracid; Ultracid; Ultracid 40; Ultracide; Ultracide Ciba-Geigy

Chemical Formula: $C_6H_{11}N_2O_4PS_3$

Molecular Weight: 302.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.495 at 20°C (Hayes 1982, p. 371)

Vapor Pressure (mmHg): 0.000001 at 20°C (*Worthing 1979)

METHIDATHION

SECTION II (continued)

Melting Point: 102-104°F, 39-40°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 240 mg/liter at 25°C (*Worthing 1979)

Appearance and Odor: Colorless crystals (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (Hayes 1982, p. 301)

Health Hazards (Acute, Delayed, and Chronic): This material is poisonous to humans. Its toxic effects are by action on the nervous system. Human volunteers ingesting 0.11 mg/kg/day for 6 weeks had no clinical effects (Hayes 1982, p. 371).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special

METHIDATHION

SECTION IV (continued)

protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, in neutral or weak acid solution (*Martin and Worthing 1974)

Conditions to Avoid: Hydrolyzed by alkali (*Worthing 1979)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a non-systemic insecticide (*Worthing 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

METHIDATHION

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms are similar to parathion poisoning and may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, dizziness, giddiness, weakness, muscle twitching, difficult breathing, sensation of tightness of chest, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NORBORMIDE

CAS Registry Number: 991-42-4

Synonyms: 5-Norbornene-2,3-Dicarboximide, 5-(alpha-Hydroxy-alpha-2-Pyridylbenzyl)-7-(alpha-2-Pyridylbenzylidene)-; Compound S-6,999; Raticide; Raticate; ENT 51,762; Shoxin; McN 1025; McNeil 1025; 4,7-Methano-1H-Isoindole-1,3(2H)-Dione,3a,4,7,7a-Tetrahydro-5-(Hydroxyphenyl-2-Pyridinylmethyl)-8-(Phenyl-2-Pyridinylmethylene)-; S 6999; S-6,999

Chemical Formula: $C_{33}H_{25}N_3O_3$

Molecular Weight: 511.55

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 5.3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 374-388°F, 190-198°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble unless pH is less than 4 (*Merck 1976); 60 mg/liter at room temperature (*Worthing 1979)

NORBORMIDE

SECTION II (continued)

Appearance and Odor: Colorless to off-white crystalline powder (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Moderately to highly toxic to humans. Probable human lethal dose is 50 to 500 mg/kg, or 1 teaspoon to 1 pint for a 150 lb. person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 2069).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Worthing 1979)

NORBORMIDE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Alkalies (*Worthing 1979)

Hazardous Decomposition or Byproducts: Nitrogen oxides when heated to decomposition (Sax 1984, p. 2069).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a selective rat poison (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Exposure may cause a transient decrease in temperature and blood pressure (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIETHOXYSILANE

CAS Registry Number: 998-30-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 593) Silane, Triethoxy-

Chemical Formula: $C_6H_{16}O_3Si$

Molecular Weight: 164.31

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.5 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 270-275°F, 132-135°C (Weast 1983, p. C-516)

Specific Gravity (H_2O=1): 0.8745 at 20°C/4°C (Weast 1983, p. C-516)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

TRIETHOXYSILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Toxicity is similar to silanes (Sax 1984, p. 2637). Silanes are moderately irritating to skin, eyes, and mucous membranes (Sax 1984, p. 2395). Silane compounds are toxic (Hawley 1981, p. 919).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2637).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

TRIETHOXYSILANE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke and fumes (Sax 1984, p. 2637).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

TRIETHOXYSILANE

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLORMEQUAT CHLORIDE

CAS Registry Number: 999-81-5

Synonyms: (2-Chloroethyl)Trimethylammonium Chloride; 60-CS-16; Antywylegacz; beta-Chloroethyltrimethylammonium Chloride; CCC; CCC Plant Growth Regulant; CE CE CE; Chlorocholine Chloride; Chlorcholine Chloride; Cycogan; Cycogan Extra; Cyocel; EI 38,555; Ethanaminium, 2-Chloro- N,N,N-Trimethyl-, Chloride; NCI-C02960; Retacel; Stabilan; Trimethyl-beta- Chloroethylammonium Chloride; TUR

Chemical Formula: $C_5H_{13}Cl_2N$

Molecular Weight: 158.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statu ory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 473°F, 245°C; decomposes (Merck 1983, p. 295)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Merck 1983, p. 295)

CHLORMEQUAT CHLORIDE

SECTION II (continued)

Appearance and Odor: White crystals with a fish-like odor (Merck 1983, p. 295)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Farm Chemicals Handbook 1984, p. C52)
Skin: Yes (Farm Chemicals Handbook 1984, p. C52)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Inhalation of spray and prolonged or repeated contact with skin should be avoided (Farm Chemicals Handbook 1984, p. C52).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Solid, n.o.s.) For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

CHLORMEQUAT CHLORIDE

SECTION V (continued)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Plant growth regulator said to be effective for cereal grains, tomatoes, and peppers (Hawley 1981, p. 302).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Solid, n.o.s.) Keep unnecessary people away. Isolate hazard area and deny entry. Stop leak if you can do it without risk. For 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 in clean, dry container and cover, move from spill area. For large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIAMIPHOS

CAS Registry Number: 1031-47-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 118) Phosphonic Diamide, p-(5-Amino-3-Phenyl-1H-1,2,4-Triazol-1-yl)-N,N,N',N'-Tetramethyl-; 5-Amino-1-bis(Dimethylamide)Phosphoryl-3-Phenyl-1,2,4-Triazole; 5-Amino-1-(bis(Dimethylamino)Phosphinyl)-3-Phenyl-1,2,4-Triazole; 5-Amino-1-bis(Dimethylamido)Phosphoryl-3-Phenyl-1,2,4-Triazole; ENT 27,223; 5-Amino-3-Phenyl-1,2,4-Triazole-1-yl-N,N,N',N'-Tetramethylphosphodiamide; 5-Amino-3-Phenyl-1,2,4-Triazolyl-1-bis(Dimethylamido)Phosphate; 5-Amino-3-Phenyl-1,2,4-Triazolyl-N,N,N',N'-Tetramethylphosphonamide; bis(Dimethylamino)-3-Amino-5-Phenyltriazolyl Phosphine Oxide; 3-Phenyl-5-Amino-1,2,4-Triazolyl-(1)-(N,N'-Tetramethyl) Diamidophosphonate; Triamphos; Wepsin; Wepsyn; Wepsyn 155; WP 155

Chemical Formula: $C_{12}H_{19}N_6OP$

Molecular Weight: 294.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

TRIAMIPHOS

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Solid (Encyc Occupat Health and Safety 1983, p. 1622)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 202)
Skin: Yes (Sax 1984, p. 202)
Ingestion: Yes (Sax 1984, p. 202)

Health Hazards (Acute, Delayed, and Chronic): Triamiphos is an organic phosphorus insecticide (Encyc Occupat Health and Safety 1983, p. 1622). Organic phosphorus insecticides are absorbed by the skin, as well as by the respiratory and gastrointestinal tracts. It is a cholinesterase inhibitor (Hayes 1982, p. 301).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Triamiphos is listed as an organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1622). This material may burn, but does not ignite readily. Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: As for other organophosphorus pesticides, stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: As for other organophosphorus pesticides, containers may explode in heat of fire (DOT 1984, Guide 55). Heat may cause decomposition and evolution of highly toxic fumes of

TRIAMIPHOS

SECTION IV (continued)

nitrogen oxides and phosphorus oxides (Sax 1984, p. 202).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of nitrogen oxides and phosphorus oxides (Sax 1984, p. 202).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used in the control of powdery mildew on apples and ornamentals (Buchel 1983, p. 258). Product discontinued by U.S. supplier (Farm Chemicals Handbook 1984, p. C244).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Triamiphos is an organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1622). Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Small dry spills: with clean shovel place material into clean dry containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

TRIAMIPHOS

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Triamiphos is an organic phosphorus insecticide (Encyc Occupat Health and Safety 1983, p. 1622). Symptoms are secondary to cholinesterase inhibition: headache, giddiness, blurred vision, nervousness, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include sweating, tearing, salivation, vomiting, bluing of the skin, loss of reflexes, loss of sphincter control, convulsions, and coma (Hayes 1982, p. 302).

Emergency and First Aid Procedures: Triamiphos is an organic phosphorus insecticide (Encyc Occupat Health and Safety 1983, p. 1622). Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched, no information found:

Weast 1979
Hawley 1981
Verschueren 1983
Gosselin 1984
NFPA 1984
Weiss 1980
Clayton and Clayton 1981-82
Merck 1983
ACGIH 1983
NIOSH/OSHA 1978

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIMETHYLTIN CHLORIDE

CAS Registry Number: 1066-45-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 627) Stannane, Chlorotrimethyl-; Chlorotrimethylstannane; Chlorotrimethyltin; M&T Chemicals 1222-45; Trimethylchlorostannane; Trimethylchlorotin; Trimethylstannyl Chloride

Chemical Formula: C_3H_9ClSn

Molecular Weight: 199.26

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 12.6 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 99°F, 37°C (Sax 1984, p. 782)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

TRIMETHYLTIN CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Tin, organic compounds) TWA 0.1 mg/m^3, as tin (NIOSH 1987, p. 224)

ACGIH TLV: (Tin, organic compounds) TWA 0.1 mg/m^3, as tin (skin) (ACGIH 1986-87, p. 31)

IDLH: Not Found

Other Limits Recommended: (Non-Specific -- Tin Compounds, Organic) IDLH 200 mg/m^3 (NIOSH/OSHA 1978, p. 180). (Tin, organic compounds) NIOSH: 0.1 mg/m^3 10-hour TWA, as tin (NIOSH 1987, p. 224)

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Tin Compounds, Organic) (NIOSH/OSHA 1978, p. 181)
Skin: Yes (Non-Specific -- Tin Compounds, Organic) (NIOSH/OSHA 1978, p. 181)
Ingestion: Yes (Non-Specific -- Tin Compounds, Organic) (NIOSH/OSHA 1978, p. 181)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Tin Compounds, Organic) The material is an irritant to the skin and gastrointestinal tract. Contact may specifically damage the following target organs: central nervous system, eyes, liver, urinary tract, and skin (NIOSH/OSHA 1978, p. 180).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 782)

TRIMETHYLTIN CHLORIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorides (Sax 1984, p. 782).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Tin Compounds, Organic) Inhalation causes headache, lethargy, and irritated eyes. Symptoms of ingestion include throat irritation, coughing, and abdominal pain. Skin contact results in burns and sores (NIOSH/OSHA 1978, p. 180).

Emergency and First Aid Procedures: (Non-Specific -- Tin Compounds, Organic) In case of skin or eye contact wash immediately with large amounts of water. If ingested, dilute with water and induce vomiting. If breathing is interrupted, apply artificial respiration or oxygen (NIOSH/OSHA 1978, p. 180).

COMMENTS

Sources searched but no information found:

Hawley 1981
Weast 1979
Merck 1983
DOT 1984
NFPA 1984

TRIMETHYLTIN CHLORIDE

COMMENTS (continued)

Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NITROCYCLOHEXANE

CAS Registry Number: 1122-60-7

Synonyms: (SANSS 1983 Synonyms) Cyclohexane, Nitro-

Chemical Formula: $C_6H_{11}NO_2$

Molecular Weight: 129.16

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.15 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 401.9°F, 205.5°C at 768 mmHg (Weast 1979, p. C-262)

Specific Gravity (H_2O=1): 1.0610 at 20°C/4°C (Weast 1979, p. C-262)

Vapor Pressure (mmHg): Not Found

Melting Point: -29°F, -34°C (Weast 1979, p. C-262)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1979, p. C-262)

Appearance and Odor: Colorless liquid (Beilstein 1954, B51 p. 10)

NITROCYCLOHEXANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Move container from fire area if you can do it without risk. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: 2

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

NITROCYCLOHEXANE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Liquid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Absorb small spills with sand or other noncombustible absorbent materials. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
CPE	GOOD/LIMITED**
Nitrile	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Liquid, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material from

NITROCYCLOHEXANE

SECTION IX (continued)

skin is of extreme importance. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PYRIDINE, 4-NITRO-, 1-OXIDE

CAS Registry Number: 1124-33-0

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 427) 4-Nitro-Pyridine-N-Oxide

Chemical Formula: $C_5H_4N_2O_3$

Molecular Weight: 140.11

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

PYRIDINE, 4-NITRO-, 1-OXIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2040)

Health Hazards (Acute, Delayed, and Chronic): High toxicity via oral exposure (Sax 1984, p. 2040).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides (Sax 1984, p. 2040).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2040)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides (Sax 1984, p. 2040).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PYRIDINE, 4-NITRO-, 1-OXIDE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Hawley 1981
Hayes 1982
Merck 1983
Gilman 1985
Gosselin 1984
Weiss 1980
Student 1981
Encyc Occupat Health and Safety 1983
Buchel 1983
Clayton and Clayton 1981-82
Farm Chemicals Handbook 1984
DOT 1984
CHRIS 1978
Verschueren 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METOLCARB

CAS Registry Number: 1129-41-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 840) Carbamic Acid, Methyl-, m-Tolyl-Ester; Carbamic Acid, Methyl-, 3-Tolyl Ester; m-Cresyl Methylcarbamate; m-Cresyl ester of N-Methylcarbamic Acid; Dicresyl; DRC 3341; Kumiai; Metacrate; 3-Methylphenyl N-Methylcarbamate; MTMC; m-Tolyl N-Methylcarbamate; 3-Tolyl-N-Methylcarbamate; Tsumacide; Carbamic Acid, Methyl-, 3-Methylphenyl Ester

Chemical Formula: $C_9H_{11}NO_2$

Molecular Weight: 165.21

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.475 mg/liter (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notif cation under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.00001 at 25°C (Farm Chemicals Handbook 1984, p. C236)

Melting Point: 169-171°F, 76-77°C (Farm Chemicals Handbook, 1984, p. C236)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

METOLCARB

SECTION II (continued)

Solubility in Water: 2.6 g/liter at 30°C (Farm Chemicals Handbook 1984, p. C236)

Appearance and Odor: Colorless crystalline solid (Farm Chemicals Handbook 1984, p. C236)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1823)
Skin: Yes (Sax 1984, p. 1823)
Ingestion: Yes (Sax 1984, p. 1823)

Health Hazards (Acute, Delayed, and Chronic): High oral and skin toxicity, and moderate inhalation toxicity (Sax 1984, p. 1823). (Non-Specific -- Carbamates) Some carbamates appear to be carcinogenic, teratogenic, and/or mutagenic (Sax 1984, p. 631). Carbamates are cholinesterase inhibitors (Hayes 1982, p. 436).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not Flammable (Farm Chemicals Handbook 1984, p. C236)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Metolcarb is a carbamate insecticide (Buchel 1983, p. 131). Solid carbamate pesticides may burn but do not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, and foam. For large fires, use water spray, fog or foam. Dike fire control water for later disposal (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Procedures for carbamate pesticides, solid, include the following. Stay upwind and keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

METOLCARB

SECTION IV (continued)

Unusual Fire and Explosion Hazards: As for other solid carbamate pesticides, container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 1823)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits toxic fumes of nitrogen oxides when heated to decomposition (Sax 1984, p. 1823).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Metolcarb is an insecticide for the control of rice leafhoppers, planthoppers, codling moth, citrus mealybug, onion thrips, fruit flies, bollworms and aphids (Farm Chemicals Handbook 1984, p. C236). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). For solid carbamate pesticides, use the following procedures. For small spills, take up with sand or other noncombustible absorbent material and place in containers for later disposal. For small dry spills, with clean shovel place material into clean, dry container and cover; move container from spill area. For large spills, dike far ahead of spill for later disposal. Do not touch spilled material. Use water spray to reduce vapors (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

METOLCARB

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Metolcarb is a carbamate insecticide (Buchel 1983, p. 131). Signs and symptoms of poisoning by carbamates are similar to those for organic phosphorus compounds (Hayes 1982, p. 437). Symptoms of poisoning by organic phosphorus compounds include headache, giddiness, nervousness, blurred vision, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include sweating, myosis, tearing, salivation and other excessive respiratory tract secretion, vomiting, cyanosis, uncontrollable muscle twitches followed by muscular weakness, convulsions, coma, loss of reflexes, and loss of muscular control (Hayes 1982, p. 301).

Emergency and First Aid Procedures: Procedures for carbamate pesticides, solid, are as follows. Move victim to fresh air and call emergency care. If not breathing, give artificial respiration. If breathing is difficult, provide oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact, immediately flush skin or eyes with water for 15 minutes. Speed in removing material from skin is of extreme importance. Keep victim quiet and maintain normal body temperature. Carefully observe victim since effects may be delayed (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ARSENIC PENTOXIDE

CAS Registry Number: 1303-28-2

Synonyms: Arsenic (V) Oxide; Arsenic Acid; Arsenic Acid Anhydride; Arsenic Anhydride; Arsenic Oxide; Arsenic Pentaoxide; Diarsenic Pentoxide; Orthoarsenic Acid (Weiss 1980, p. 126); Zotox

Chemical Formula: As_2O_5

Molecular Weight: 229.84

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 5000 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 4.32 (*Clayton and Clayton 1981-82)

Vapor Pressure (mmHg): Not Found

Melting Point: 599°F, 315°C (Hawley 1981, p. 89)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble (*Merck 1983)

Appearance and Odor: White (*Hawley 1977), amorphous lumps or powder (*Merck 1983). Odorless (Weiss 1980, p. 126)

ARSENIC PENTOXIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p. 54)

ACGIH TLV: 0.2 mg/m^3, as arsenic (*ACGIH 1983)

IDLH: Not Found

Other Limits Recommended: (Arsenic and compounds) NIOSH: ceiling 0.002 mg/m^3, 15 minutes, as arsenic (NIOSH 1987, p. 54) (Arsenic and compounds) NIOSH occupational carcinogen (NIOSH 1987, p. 54)

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*IARC 1972-85)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose for humans is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150-lb. person (*Gosselin 1976). It is irritating to eyes, nose, and throat (Weiss 1980, p. 126). Chronic exposure may cause nerve damage to the extremities, alter cellular composition of the blood, and cause structural changes in blood components (*Goodman 1980). There is sufficient evidence that inorganic arsenic compounds are skin and lung carcinogens in humans (*IARC 1972-85).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not flammable (Weiss 1980, p. 126)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*CHRIS 1978)

ARSENIC PENTOXIDE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Will corrode metal and may give off toxic arsine gas (Weiss 1980, p. 126)

Hazardous Decomposition or Byproducts: Reacts with metal and may give off toxic arsine gas (Weiss 1980, p. 126).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 126)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a chemical intermediate, as a herbicide, and as an ingredient in wood preservatives and in glass. Other possible uses are as an insecticide and soil sterilant (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing dust (see Section III above). Stay upwind; keep out of low areas. Do not touch spilled material. Absorb small spills with sand or other noncombustible absorbent material and place into containers for later disposal. For small dry spills, use clean shovel to place material in clean, dry container. For large spills, dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

ARSENIC PENTOXIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms usually appear 1/2 to 1 hour after ingestion, but may be delayed. Symptoms include a sweetish, metallic taste and garlicky odor of breath; difficulty in swallowing; abdominal pain; vomiting and diarrhea; dehydration; feeble heart beat; dizziness and headache; and eventually coma, sometimes convulsions, general paralysis, and death (*Gosselin 1984).

Emergency and First Aid Procedures: Move victim to fresh air and call emergency medical care. Remove contaminated clothing and shoes. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (*DOT 1984). In case of ingestion, induce vomiting; give plenty of lime water, milk, or raw egg (Weiss 1980, p. 126).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CADMIUM OXIDE

CAS Registry Number: 1306-19-0

Synonyms: Cadmium Fume; Cadmium Monoxide; Cadmium Oxide Fume; NCI-CO2551

Chemical Formula: CdO

Molecular Weight: 128.40

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.5 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Cadmium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Crystalline form: 8.15 (*Weast 1979); Amorphous form: 6.95 (Weast 1979, p. B-103)

Vapor Pressure (mmHg): 1 at 1000°C (*Sax 1975)

Melting Point: Greater than 2732°F, greater than 1500°C (Weast 1979, p. B-103)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Weast 1979)

Appearance and Odor: Brown crystals or brown amorphous powder (*Weast 1979)

CADMIUM OXIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Cadmium fume/cadmium oxide fume) TWA 0.1 mg/m^3, as cadmium; Ceiling 0.3 mg/m^3, as cadmium (NIOSH 1987, p. 68)

ACGIH TLV: (Fume) Ceiling 0.05 mg/m^3, as cadmium; (Production) TWA 0.05 mg/m^3, as cadmium (ACGIH 1986-87, p. 12)

IDLH: (Cadmium fume/cadmium oxide fume) 40 mg/m^3, as cadmium (NIOSH 1985, p. 68)

Other Limits Recommended: NIOSH: lowest feasible limit (NIOSH 1987, p. 68) NIOSH occupational carcinogen (NIOSH 1987, p. 68)

Routes of Entry: **Inhalation:** Yes (*IARC 1972-1985)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 613)

Health Hazards (Acute, Delayed, and Chronic): The lethal inhalation dose of cadmium oxide in humans is 2,500 mg/m^3 for a 1 minute exposure (*IARC 1972-1985). Lethal exposure has been established at 50 mg (cadmium)/m^3 for 1 hour for cadmium oxide dust and 1/2 hour for the fume (*Casarett 1975). These concentrations may be inhaled without sufficient discomfort to warn worker of exposure (*Sax 1984, p. 612). Inhalation may cause acute tracheobronchitis, pneumonitis, and pulmonary edema. Exposure can cause kidney and lung damage (*Encyc Occupat Health and Safety 1981). Acute exposure by inhalation may cause death by anoxia. The lowest human toxic inhalation concentration is 8.630 mg/m^3/5 hours for the fume (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Persons with respiratory disorders should be excluded from contact with this material (*Encyc Occupat Health and Safety 1971).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: (Non-Specific -- Cadmium Compounds) This material may burn but does not ignite readily (DOT 1984, Guide 53).
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Cadmium Compounds) Extinguish with dry chemical, carbon dioxide, water fog, spray, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Cadmium Compounds) Wear self-contained breathing apparatus and full protective clothing. Move container from fire if you can do so without risk (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of cadmium (Sax 1984, p. 613). (Non-Specific -- Cadmium Compounds) Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 53).

CADMIUM OXIDE

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Oxides of cadmium react explosively with magnesium when heated (*NFPA 1978).

Hazardous Decomposition or Byproducts: Toxic fumes may form in a fire (*CHRIS 1978). When heated to decomposition, it emits toxic fumes of cadmium (Sax 1984, p. 613).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Cadmium oxide is used as an electroplating chemical and in the manufacture of cadmium electrodes. It is a component of silver alloys, phosphors, semiconductors, glass and ceramic glazes (*SRI). It was formerly used by veterinarians to kill worms and parasites (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

If dust is released in a hazardous concentration: (1) remove all ignition sources; (2) ventilate area of release; and (3) collect released material and place in sealed containers in secured sanitary landfill (*NIOSH/OSHA 1981). (Non-Specific -- Cadmium Compounds) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, keep out of low areas. If pollution of water occurs, notify proper authorities. Do not touch spilled material; stop leak if you can do so without risk. Absorb small spills 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 container from spill area. Dike large spills far ahead for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

CADMIUM OXIDE

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CADMIUM OXIDE

(1306-19-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless, amorphous powder; brown or red crystals.

Odor - None.

Commercial Form - Silver-white or yellow-brown to brown solid.

Uses - Catalyst for organic reactions; electroplating; manufacture of electrodes, silver alloys, semiconductors, glass, and ceramic glazes.

Other Names - Cadmium fume, cadmium monoxide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, EDTA.

Signs and Symptoms of Acute Cadmium Oxide Exposure:

Warning: *Effects may be delayed for hours. Caution is advised.*

The following signs and symptoms may be noted following exposure to cadmium oxide: cough, dyspnea (shortness of breath), dry mouth or increased salivation, abdominal pain, nausea, vomiting, bronchitis, and chest pain. Pulmonary edema may develop. Vertigo (dizziness), fever, and profuse sweating are common. Victims may collapse.

CADMIUM OXIDE

Emergency Life-Support Procedures:

Acute exposure to cadmium oxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to cadmium oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to cadmium oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

CADMIUM OXIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of cadmium oxide is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of cadmium oxide may result in sudden loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHORUS PENTOXIDE

CAS Registry Number: 1314-56-3

Synonyms: Diphosphorus Pentaoxide; Diphosphorus Pentoxide; Phosphoric Acid Anhydride; Phosphoric Acid, Anhydrous; Phosphoric Anhydride; Phosphoric Oxide; Phosphoric Pentoxide; Phosphorus Oxide; Phosphorus Pentaoxide; Phosphorus(V)Oxide; Phosphorus, Oxide, Pent-

Chemical Formula: P_2O_5

Molecular Weight: 141.96

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (guinea pig) 0.061 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Sublimes at 572°F, 300°C (Weast 1983, p. B-119)

Specific Gravity (H_2O=1): 2.39 (*Weast 1979)

Vapor Pressure (mmHg): 1 at 384°C (Weast 1983, p. D-197)

Melting Point: 340°C (Merck 1983, p. 7247)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: White powdery crystals (*Weast 1979)

PHOSPHORUS PENTOXIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Hygienic standard recommended in AIHA Guide is 1 mg (phosphorus pentoxide)/m^3 of air (*Clayton and Clayton 1981-82).

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Powder and fumes in the air are irritating to eyes and the respiratory tract (*Grant 1974). Particles in contact with eye react vigorously and even a small amount may cause permanent burns. Contact with the skin will cause severe burns. Ingestion will damage the gastrointestinal tract (*Rumack 1975 to Present). Corrosive to skin, mucous membranes and eyes (Merck 1983, p. 1061).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Flammable (Merck 1983, p. 1061)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Does not support combustion (Merck 1983, p. 1061). Do not get water inside container. For small fires, use dry chemical or carbon dioxide. For large fires, flood fire area with water from a distance. Do not get solid stream of water on spilled material. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 39).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special protective clothing. Keep combustibles away from spilled material (DOT 1984, Guide 39).

Unusual Fire and Explosion Hazards: Reacts violently with water to evolve heat (Hawley 1981, p. 809). Flammable poisonous gases may accumulate in tanks and hopper cars (DOT 1984 Guide 39). Phosphorus pentoxide reacts violently with the following: ammonia, hydrofluoric acid, oxygen difluoride, potassium, sodium, propargyl alcohol, calcium oxide, sodium hydroxide and chlorine trifluoride. A violent explosion occurs if a solution of perchloric acid in chloroform is poured over phosphorus pentoxide (*NFPA 1978).

NFPA Flammability Rating: Not Found

PHOSPHORUS PENTOXIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Hawley 1977)

Conditions to Avoid: Readily absorbs moisture from air to form meta-, pryo-, or orthophosphoric acid (*Hawley 1977).

Incompatibility (Materials to Avoid): Formic acid, hydrogen fluoride, inorganic bases, metals, oxidants, water (Sax 1984, p. 2224). Phosphorus pentoxide reacts violently with the following: ammonia, hydrofluoric acid, oxygen difluoride, potassium, sodium, propargyl alcohol, calcium oxide, sodium hydroxide and chlorine trifluoride. A violent explosion occurs if a solution of perchloric acid in chloroform is poured over phosphorus pentoxide (*NFPA 1978).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Drying and dehydrating agent; condensing agent in organic synthesis (*Merck 1976). Used in the preparation of acrylate esters, surfactants, sugar refining, medicine, fire extinguishing, and special glasses (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering them. Stop leak if possible without risk. Do not touch spilled material. Use water spray to reduce vapors, but do not put water on leak or spill. Keep combustibles away from spilled material. Dike spilled area and keep water away from spill. Clean up requires supervision by an expert (DOT 1985, Guide 39).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PHOSPHORUS PENTOXIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHOSPHORUS PENTOXIDE

(1314-56-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White crystalline powder.

Commercial Form - 98% pure powder in glass bottles, cans, or drums.

Uses - Drying and dehydrating, organic syntheses, sugar refining, pharmaceutical and glass manufacturing, flame retardants, fire extinguishing.

Materials to Avoid - Alkali, metals, oxidizers, water (except for use in emergency life support).

Caution: *Reacts violently with water to evolve heat and generate aqueous phosphoric acid.*

Other Names - Diphosphorus pentaoxide, phosphoric acid anhydride, phosphoric oxide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, dopamine, norepinephrine.

Signs and Symptoms of Acute Phosphorus Pentoxide Exposure:

Signs and symptoms of acute exposure to phosphorus pentoxide may include severe burns, pain, shock, intense thirst, nausea, vomiting, diarrhea, severe abdominal pain, and "smoking stools." The breath and feces may have a garlicky odor. A symptom-free period of several days may follow.

PHOSPHORUS PENTOXIDE

Exposure to phosphorus pentoxide may also result in bloody vomitus and diarrhea, jaundice, liver enlargement with tenderness, renal damage, hematuria (bloody urine), and either oliguria (scanty urination) or anuria (suppression of urine formation). Headache, convulsions, delirium, coma, cardiac arrhythmias, and cardiovascular collapse may occur.

If phosphorus pentoxide contacts the eyes, severe irritation and burns, blepharospasm (spasmodic winking), lacrimation (tearing), and photophobia (heightened sensitivity to light) may occur. Eye contact may lead to a total destruction of the eyes. Victims may experience spontaneous hemorrhaging of phosphorus pentoxide-contaminated skin and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to phosphorus pentoxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phosphorus pentoxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phosphorus pentoxide.

PHOSPHORUS PENTOXIDE

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. Brush nonadherent phosphorus pentoxide from skin areas, then flush skin with water. Immerse exposed skin areas in water or cover with a wet dressing.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for AT LEAST 15 MINUTES. Keep exposed eyes covered with wet compresses.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

4. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

5. Ambulate (walk) and give water to the victims.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- VANADIUM PENTOXIDE

CAS Registry Number: 1314-62-1

Synonyms: CI 77938; Divanadium Pentaoxide; Divanadium Pentoxide; Vanadic Anhydride; Vanadium Oxide; Vanadium Pentaoxide

Chemical Formula: V_2O_5

Molecular Weight: 181.90

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 3182°F, 1750°C (decomposition) (*NIOSH/OSHA 1981)

Specific Gravity (H_2O=1): 3.357 at 18°C (*Hawley 1981)

Vapor Pressure (mmHg): Approximately 0 at 20°C, 68°F (*NIOSH/OSHA 1981)

Melting Point: 1274°F, 690°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 1 g in 125 ml (*Merck 1983)

Appearance and Odor: Vanadium pentoxide exists as a yellow-orange powder, dark gray flakes, or yellow to rust brown crystals (*NIOSH/OSHA 1981; *Merck 1983). It is odorless (*CHRIS 1978)

VANADIUM PENTOXIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 0.5 mg/m^3, as vanadium (dust); Ceiling 0.1 mg/m^3, as vanadium (fume) (NIOSH/OSHA 1978, p. 188)

ACGIH TLV: TWA 0.05 mg/m^3 (respirable dust and fume) (ACGIH 1985, p. 33)

IDLH: 70 mg/m^3 (NIOSH/OSHA 1978, p. 188)

Other Limits Recommended: (Dust and fume) NIOSH: 0.05 mg/m^3 15-minute ceiling (NIOSH 1987, p.234)

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2718)
Skin: Yes (Merck 1983, p. 1418)
Ingestion: Yes (Sax 1984, p. 2718)

Health Hazards (Acute, Delayed, and Chronic): Probable oral lethal dose for humans is between 5 and 50 mg/kg or between 7 drops and 1 teaspoonful for a 70 kg (150 lb.) person (*Gosselin 1984). Toxicity is about the same magnitude as pentavalent arsenic (Gosselin 1984, p. II-148).

Medical Conditions Generally Aggravated by Exposure: Chronic respiratory disease (*Encyc Occupat Health and Safety 1983).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not Flammable (Weiss 1980, p. 909)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Container may explode in heat of fire (DOT 1984, Guide 55) When heated to decomposition, it emits acrid smoke and fumes of vanadium oxides (Sax 1984, p. 2718). Material is not flammable but it may increase the intensity of the fire when in contact with combustible materials (Weiss 1980, p. 909).

NFPA Flammability Rating: Not Found

VANADIUM PENTOXIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 909)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Chlorine trifluoride; lithium; peroxyformic acid; and calcium, sulfur, water complexes (Sax 1984, p. 2718)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke and fumes of vanadium oxides (Sax 1984, p. 2718).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 909)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

As catalyst in the oxidation of sulfur dioxide to sulfur trioxide, alcohol to acetaldehyde, etc.; for the manufacture of yellow glass; inhibiting ultraviolet light transmission in glass; depolarizer; as developer in photography; in form of ammonium vanadate as mordant in dyeing and printing fabrics and in manufacture of aniline black (Merck 1983, p. 1418).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe dust. In case of contact, immediately flush skin or eyes with water (see Section III above). Do not touch spilled materials; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for VANADIUM PENTOXIDE

(1314-62-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Yellow to rust-brown crystals, yellow-orange powder, or dark gray flakes.

Odor - None.

Commercial Form - 98 to 99% pure solid shipped in drums or multi-walled paper sacks.

Uses - Dyeing textiles, oxidation catalyst, manufacture of specialty glass, developer in photography, depolarizer.

Other Names - Divanadium pentoxide, vanadic anhydride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, dimercaprol (BAL), EDTA.

Signs and Symptoms of Acute Vanadium Pentoxide Exposure:

Acute exposure to vanadium pentoxide may result in pulmonary irritation, bronchospasm, hemoptysis (coughing up of blood), pulmonary edema, emphysema, and pneumonia. Gastrointestinal effects may include nausea, abdominal cramping, diarrhea, anorexia, and black stools. Headache, dry mouth, dizziness, nervousness, insomnia, and tremor may be found.

VANADIUM PENTOXIDE

Vanadium pentoxide is irritating to the skin, eyes, and mucous membranes. Contact may result in a green staining of the tongue and skin. Blindness and epistaxis (bloody nose) are further complications.

Emergency Life-Support Procedures:

Acute exposure to vanadium pentoxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to vanadium pentoxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to vanadium pentoxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

VANADIUM PENTOXIDE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of vanadium pentoxide is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ZINC PHOSPHIDE

CAS Registry Number: 1314-84-7

Synonyms: Blue-ox; Delusal; Kilrat; Mous-con; Phosvin; Rumetan; Stutox; Trizinc Diphosphide; Wuehlmaus-Koeder; Wuehlmaustod Arvikol; Zinc Phosphide (Zn3P2); Zinc-tox; ZP

Chemical Formula: P_2Zn_3

Molecular Weight: 258.09

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 12 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 2012°F, 1100°C (*Merck 1983)

Specific Gravity (H_2O=1): 4.55 (*Merck 1983)

Vapor Pressure (mmHg): Not Found

Melting Point: 788°F, 420°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (Weast 1979, p. B-143); insoluble (Merck 1983, p. 1457)

Appearance and Odor: Dark gray crystals, lustrous or dull powder with a faint phosphorus odor (*Merck 1983); dark gray granular solid (Student 1984, p. 541)

ZINC PHOSPHIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Arena 1974)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This compound is very caustic when ingested. Zinc phosphide reacts with water and acid in the stomach and causes severe irritation (*Doull 1980). The probable oral lethal dose is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 70 kg (150 lb.) person. Most patients die after about 30 hours from peripheral vascular collapse secondary to the compound's direct effects. Extensive liver damage and kidney damage can also occur. Ingestion of 4-5 grams has produced death in human adults, but also doses of 25 to 50 grams have been survived (*Gosselin 1976). The lowest oral lethal dose reported for women is 80 mg/kg (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Do not use water or foam. Small fires, use dry chemical, soda ash or lime. Large fires, withdraw from area and let burn (DOT 1984, Guide 41). Do not use any agent with an acid reaction (i.e., carbon dioxide or halogenated agents) as phosphine will be liberated (*CHRIS 1978).

Special Fire Fighting Procedures: Wear boots, protective gloves, and goggles. Wear self-contained breathing apparatus when fighting fires involving this material (Student 1981, p. 541). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Move container from fire area if you can do so without risk (DOT 1984, Guide 41).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of phosphorus and zinc oxides (Sax 1984, p. 2756). Irritating oxides of phosphorus may be formed in fires (*CHRIS 1978). May ignite in presence of moisture. Contact with water produces flammable gas. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 41).

NFPA Flammability Rating: Not Found

ZINC PHOSPHIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Farm Chemicals Handbook 1984)

Conditions to Avoid: May ignite in the presence of moisture, or evolve flammable gas (*DOT 1984). Stable unless exposed to moisture; toxic phosphine gas may then be released and collected in closed spaces (Sax 1984, p. 2756).

Incompatibility (Materials to Avoid): Reacts violently with concentrated sulfuric acid, nitric acid, and other oxidizing agents (*Merck 1983). Reacts with hydrochloric acid or sulfuric acid with the evolution of spontaneously flammable phosphine (Merck 1983, p. 1457).

Hazardous Decomposition or Byproducts: Decomposed slowly by water giving off phosphine, a flammable poison gas (Student 1981, p. 541). When heated to decomposition, it emits toxic fumes of oxides of phosphorus and zinc (Sax 1984, p. 2756).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 935)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is a rodenticide (Encyc Occupat Health and Safety 1983, p. 2341) used in the manufacture of rat and mouse poison (*Merck 1983).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not use water. Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Keep material dry. Avoid breathing dusts and fumes from burning material. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. For a land spill, dig a pit, pond, lagoon, or holding area to contain liquid or solid material. For water spill, neutralize with agricultural lime (slaked lime), crushed limestone, or sodium bicarbonate. Use mechanical dredges or lifts to remove immobilized wastes of pollutants and precipitates (Student 1981, p. 541). Small dry spills: with clean shovel place material into clean, dry container and cover; move containers from spill area. Large spills: dike spill for later disposal. Cover powder spill with plastic sheet or tarp to minimize spreading. Clean up only under supervision of an expert (DOT 1984, Guide 41).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand,

ZINC PHOSPHIDE

SECTION VIII (continued)

full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Butyl/Neoprene	GOOD/LIMITED**
CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
Viton	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Earliest symptoms of oral ingestion include nausea, abdominal pain, tightness in chest, excitement, agitation and chills. Early labored breathing, shock, halted urinary output, metabolic acidosis, muscle cramps and convulsions are grave prognostic signs (*Gosselin 1976). Inhalation of zinc phosphide dust is followed in several hours by vomiting, diarrhea, bluing of skin, rapid pulse, fever and shock. The breath smells of phosphine (*Arena 1974). The compound is very caustic and may cause closing of the esophagus (*Rumack 1975 to Present).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin and eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 41).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ARSENOUS OXIDE

CAS Registry Number: 1327-53-3

Synonyms: Arsenic Trioxide; Arsenic (III) Oxide; Arsenic Oxide; Arsenic Sesquioxide; Arsenicum Album; Arsenious Acid; Arsenious Oxide; Arsenious Trioxide; Arsenite; Arsenolite; Arsenous Acid; Arsenous Acid Anhydride; Arsenous Anhydride; Arsenous Oxide Anhydride; Arsodent; Claudetite; Crude Arsenic; Diarsenic Trioxide; White Arsenic

Chemical Formula: As_2O_3

Molecular Weight: 197.8

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (man) 1.43 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 5000 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 869°F, 465°C (*Merck 1976)

Specific Gravity (H_2O=1): 3.738 (amorphous or vitreous); 3.865 (arsenolite); 4.15 (claudetite) (Weast 1983, p. B-71)

Vapor Pressure (mmHg): 66.1 at 312°C (*Worthing 1979)

Melting Point: 594.1°F, 312.3°C; 379°F, 193°C sublimes (arsenolite and claudetite) (Weast 1983, p. B-71)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Sparingly soluble in cold water. Soluble in 15 parts boiling water (*Merck 1976).

ARSENOUS OXIDE

SECTION II (continued)

Appearance and Odor: White or transparent, glassy, amorphous lumps or crystalline powder (*Merck 1976); odorless (*Hawley 1977).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and coumpounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p. 54)

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: (Arsenic trioxide production) Industrial substance suspect of carcinogenic potential for man (ACGIH 1986-87, p. 10)

Routes of Entry: **Inhalation:** Yes (*Friberg 1979)
Skin: Not Found
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): Material is considered super toxic; probable oral lethal dose (human) is less than 5 mg/kg, i.e., a taste (less than 7 drops) for a 70kg (150 lb.) person. Material causes acute gastrointestinal and central nervous system symptoms. Renal and hepatic damage have also been observed (*Gosselin 1976). Chronic exposure to material has led to nasal septum perforation, dermatological symptoms (lesions, necrosis, etc.) and an increase in the incidence of lung and lymphatic cancers (*Gosselin 1976, *Clayton and Clayton 1981-82, *Venugopal 1978, *ACGIH 1981). Appreciable exposure to respiratory irritant promoters such as metal oxide fumes elicits a carcinogenic response from arsenic trioxide (*Clayton and Clayton 1981-82).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not Flammable (*CHRIS 1980)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty). Use water in flooding quantities as fog. Use foam, carbon dioxide or dry chemical (*Student 1981).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus (*Student 1981).

Unusual Fire and Explosion Hazards: Toxic fumes of arsenic trioxide and arsine may be formed in fire situations (*CHRIS 1980).

ARSENOUS OXIDE

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: It is stable in air but slowly oxidizes in acid media (*Worthing 1979).

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Sodium chlorate; fluorine; chlorine trifluoride; chromic oxide; aluminum chloride; phosphorus pentoxide; hydrogen fluoride; oxygen difluoride (*NFPA 1978); tannic acid; infusion cinchona and other vegetable astringent infusions and decoctions; iron in solution (*Merck 1976).

Hazardous Decomposition or Byproducts: Toxic fumes of arsenic trioxide and arsine may be formed in fire situations (*CHRIS 1980). Contact with halide acids will form toxic volatile halides. Reduction in acid solutions will form arsine (*AOAC 1965). Arsenic trioxide and excess zinc filings will explode on heating (*Bretherick 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Primary material for all arsenic compounds (*Merck 1976). It is an intermediate for insecticides, herbicides and fungicides. The material is used as a wood preservative and a decoloring and refining agent in glass manufacture. It is also used in pharmaceuticals and in the purification of synthetic gas (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing dusts, and fumes from burning materials. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water (*Student 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

ARSENOUS OXIDE

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Viton	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ARSENOUS OXIDE

(1327-53-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - White or transparent glossy amorphous lumps or crystalline powder.

Odor - None.

Commercial Form - 95 to 99% pure solid.

Uses - Primary material for arsenic compounds and textile mordants; manufacture of pesticides, pharmaceuticals, wood preservatives, enamels, and glass; preservation of hides; purification of synthetic gas.

Other Names - Arsenic sesquioxide, arsenic trioxide, Arsenite, arsenous acid, arsenous acid anhydride, Arsodent, Claudelite, crude arsenic, diarsenic trioxide, white arsenic.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, dopamine, norepinephrine, sodium bicarbonate, dimercaprol, penicillamine, isoproterenol.

ARSENOUS OXIDE

Signs and Symptoms of Acute Arsenous Oxide Exposure:

Warning: *Effects usually appear within 30 minutes of exposure but may be delayed for several hours. Caution is advised.*

Hypotension (low blood pressure), tachycardia (rapid heart rate), dehydration, intense thirst, difficulty swallowing, vomiting, abdominal pain, and diarrhea are among the first signs and symptoms noticed following acute arsenous oxide exposure. Headache, conjunctivitis (red, inflamed eyes), runny nose, and lacrimation (tearing) are also common. Garlic odor of breath and feces may be noted.

Cardiovascular effects include shock, tachycardia (rapid heart rate), ventricular fibrillation, and other cardiac abnormalities. Pulmonary edema may occur. Altered mental status, seizures, and delirium are further complications of arsenous oxide exposure. Intense muscle cramping is common. Exposure to airborne dust is generally accompanied by irritation of exposed skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to arsenous oxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to arsenous oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

ARSENOUS OXIDE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to arsenous oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. RUSH to a health care facility!

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. RUSH to a health care facility!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of arsenous oxide is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of arsenous oxide may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5.*

ARSENOUS OXIDE

The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ANTIMYCIN A

CAS Registry Number: 1397-94-0

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 430): Antipiricullin; Virosin

Chemical Formula: $C_{28}H_{40}N_2O_9$

Molecular Weight: 548.70

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 1.8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 149°C (Merck, 1983, p. 733)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

ANTIMYCIN A

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 307)

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

ANTIMYCIN A

SECTION V (continued)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of oxides of nitrogen (Sax 1984, p. 307).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Specific uses for Antimycin A were not found, however, Antimycin A1, and Antimycin A3 are reported to be antibiotic substances produced by Streptomyces for use as a fungicide, possible insecticide and miticide (Merck 1983, pp. 104-105, Hawley 1981, p. 82). Only registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

ANTIMYCIN A

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Weast 1979
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Hayes 1982
Physicians' Desk Reference 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DINOTERB

CAS Registry Number: 1420-07-1

Synonyms: 2,4-Dinitro-6-tert-Butylphenol; 2-(1,1-Dimethylethyl)-4,6-Dinitrophenol; 2-tert-Butyl-4,6-Dinitrophenol; Dinoterbe; DNTBP; Herbogil; Phenol, 2-(1,1-Dimethylethyl)-4,6-Dinitro-; Phenol, 2-tert-Butyl-4,6-Dinitro-; Phenol, o-t-Butyl-4,6-Dinitro-; Stirpan Forte; Veraline Creme

Chemical Formula: $C_{10}H_{12}N_2O_5$

Molecular Weight: 240.24

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 25 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 259°F, 126°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (*Worthing 1979).

Appearance and Odor: Yellow solid (*Worthing 1979).

DINOTERB

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Dinitro-o-Cresol) (ACGIH 1980, p. 152-153)
Skin: Yes (Non-Specific -- Dinitro-o-Cresol) (ACGIH 1980, p. 152-153)
Ingestion: Yes (Non-Specific -- Dinitro-o-Cresol) (ACGIH 1980, p. 152-153)

Health Hazards (Acute, Delayed, and Chronic): This compound is toxic by all routes of exposure. The dangerous single oral dose of dinitro-o-cresol, a structurally similar compound (*Rumack 1975 to Present), is estimated to be about 29 mg/kg (Hayes 1982, p. 469).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Dinitro-o-cresol) Use dry chemical, carbon dioxide, water spray, or foam for small fires, and water spray, fog, or foam for large fires. Move container from fire area if possible (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Dinitro-o-cresol) Isolate hazard area, stay upwind, and keep out of low areas. Wear self-contained breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition it emits toxic nitrogen oxide fumes (Sax 1984, p. 1160).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

DINOTERB

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits toxic nitrogen oxide fumes (Sax 1984, p. 1160).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This compound is a herbicide (Farm Chemicals Handbook 1984, p. C82) and a rodenticide (*Tsubura and Kato 1974).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). (Non-Specific -- Dinitro-o-Cresol) Do not touch spilled material; stop source of spill or leak if it can be done without risk. Take up small spills 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. Remove from spill area for later removal. Dike far ahead of spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms of poisoning are similar to other dinitrophenols (*Rumack 1975 to Present) and may include nausea, gastric distress, restlessness, sensation of heat, flushed skin, sweating, thirst, deep and rapid breathing, rapid heart rate, fever, and lack of oxygen to tissues (blueness of skin) (Hayes 1982, p. 469).

Emergency and First Aid Procedures: (Non-Specific -- Dinitro-o-Cresol) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated shoes and clothing at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIEPOXYBUTANE

CAS Registry Number: 1464-53-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 757) 1,2:3,4-Diepoxybutane; 1,1'-Bi(Ethylene Oxide); Bioxiran; Bioxirane; 2,2'-Bioxirane; Butadiene Dioxide; 2,4-Diepoxybutane; Dioxybutadiene; ENT-26592; Erythritol Anhydride; Threitol, 1,2:3,4-Dianhydro-

Chemical Formula: $C_4H_6O_2$

Molecular Weight: 86.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.317 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 280°F, 138°C at 1 atm (Merck 1983, p. 531)

Specific Gravity (H_2O=1): 1.113 at 18°C/4°C (Merck 1983, p. 531)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Weast 1980, p. C-219); hydrolyzes to erythritol (Merck 1983, p. 531)

Appearance and Odor: Colorless liquid (Sax 1984, p. 429)

DIEPOXYBUTANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 429)
Skin: Yes (Sax 1984, p. 429)
Ingestion: Yes (Sax 1984, p. 429)

Health Hazards (Acute, Delayed, and Chronic): Severe skin and eye irritant (Sax 1984, p. 429). Accidental minor exposure caused swelling of the eyelids, upper respiratory tract irritation and painful eye irritation 6 hours after exposure (Encyc Occupat Health and Safety 1983, p. 772). NOTE: The dl- and meso-forms (CAS Registry Numbers 298-18-0 and 564-00-1, respectively) as well as the L(-) form (CAS Registry Number 30031-64-2) have all been determined to be positive animal carcinogens (NIOSH/RTECS 1983, Volume 1, p. 757).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition it emits acrid smoke and irritating fumes (Sax 1984, p. 429).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke and irritating fumes (Sax 1984, p. 429).

DIEPOXYBUTANE

SECTION V (continued)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a research chemical (*SRI); in curing polymers; crosslinking textile fibers; and to prevent microbial spoilage (Merck 1983, p. 531).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE

(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	POOR/LIMITED**
Nitrile	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include swelling of the eyelids, upper respiratory tract irritation, and delayed eye irritation (Encyc Occupat Health and Safety 1983, p. 772).

Emergency and First Aid Procedures: (Poisonous Liquid or Gas, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 15).

EPA CHEMICAL PROFILE

Date: October 9, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRICHLORO(CHLOROMETHYL)SILANE

CAS Registry Number: 1558-25-4

Synonyms: (SANSS 1983 Synonyms) Silane, Trichloro(Chloromethyl)-; (Chloromethyl)Trichlorosilane; Trichloro(Chloromethyl) Silane

Chemical Formula: CH_2Cl_4Si

Molecular Weight: 184

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.03 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

TRICHLORO(CHLOROMETHYL)SILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Methyl Trichlorosilane) If inhaled, may be harmful; contact may cause burns to skin and eyes. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 29).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Methyl Trichlorosilane) Small fires: Dry chemical, CO_2, halon, water spray, or standard foam. Large fires: Water spray, fog, or standard foam is recommended (DOT 1987, Guide 29).

Special Fire Fighting Procedures: (Non-specific -- Methyl Trichlorosilane) Move container from fire area if you can do it without risk. Do not get water inside container. Cool containers that are exposed to flames with water from the side until well after fire is out. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1987, Guide 29).

Unusual Fire and Explosion Hazards: (Non-specific -- Methyl Trichlorosilane) 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. May react violently with water (DOT 1987, Guide 29).

NFPA Flammability Rating: Not Found

TRICHLORO(CHLOROMETHYL)SILANE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Methyl Trichlorosilane) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. If water pollution occurs, notify appropriate authorities. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors; do not get water inside container. Small spills: flush area with flooding amounts of water. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TRICHLORO (CHLOROMETHYL) SILANE

(1558-25-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Sharp, biting.

Commercial Form - Liquid in 1-gallon bottles (in steel containers) or 55-gallon drums.

Use - Manufacture of silicone products.

Material to Avoid - Water (except for use in emergency life support).

Caution: *Extremely flammable; may spontaneously ignite. Avoid sources of extreme heat or ignition including sparks or fire. Trichloro (chloromethyl) silane will liberate hydrochloric acid upon contact with water.*

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Trichloro (Chloromethyl) Silane Exposure:

Signs and symptoms of acute ingestion of trichloro (chloromethyl) silane may be severe, and include increased salivation, intense thirst, difficulty swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of trichloro (chloromethyl) silane.

TRICHLORO (CHLOROMETHYL) SILANE

Acute inhalation exposure may result in sneezing, choking, laryngitis, dyspnea (shortness of breath), respiratory tract irritation, and chest pain. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, pulmonary edema, chronic bronchitis, and pneumonia may also occur.

If the eyes have come in contact with trichloro (chloromethyl) silane, irritation, pain, swelling, corneal erosion, and blindness may result. Dermatitis (red, inflamed skin), severe burns, pain, and shock generally follow dermal exposure.

Emergency Life-Support Procedures:

Acute exposure to trichloro (chloromethyl) silane may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to trichloro (chloromethyl) silane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to trichloro (chloromethyl) silane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

TRICHLORO (CHLOROMETHYL) SILANE

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Rinse mouth with large amounts of water. Instruct victims not to swallow this water.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CARBOFURAN

CAS Registry Number: 1563-66-2

Synonyms: Carbamic Acid, Methyl-, 2,3-Dihydro-2,2-Dimethyl-7-Benzofuranyl Ester; 2,2-Dimethyl-2,2-Dihydrobenzofuranyl-7 N-Methylcarbamate; 2,3-Dihydro-2,2-Dimethyl-7-Benzofuranol-N-Methylcarbamate; 2,3-Dihydro-2,2-Dimethylbenzofuranyl Methylcarbamate; 2,3-Dihydro-2,2-Dimethylbenzofuranyl-7-N-Methylcarbamate; 7-Benzofuranol, 2,3-Dihydro-2,2-Dimethyl-, Methylcarbamate; Bay 70143; Chinufur; Curaterr; D 1221; ENT 27,164; FMC 10242; Furadan; Furadan 3G; Furodan; NIA 10242; Niagara 10242; Niagara Nia-10242; OMS 864; Yaltox; 7-Benzofuranol, 2,3-Dihydro-2,2-Dimethyl-, Methylcarbamate

Chemical Formula: $C_{12}H_{15}NO_3$

Molecular Weight: 221.28

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (guinea pig) 0.043 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.18 at 20°C (*Farm Chemicals Handbook 1984)

Vapor Pressure (mmHg): 0.00002 at 33°C (*Farm Chemicals Handbook 1984)

Melting Point: 302-307°F, 150-153°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

CARBOFURAN

SECTION II (continued)

Solubility in Water: 700 ppm at 25°C (*Merck 1976)

Appearance and Odor: White crystalline solid (*Merck 1976); odorless (*Farm Chemicals Handbook 1984)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 mg/m^3 (*ACGIH 1983)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely poisonous. May be fatal if swallowed, inhaled, or absorbed through skin. Contact may burn skin or eyes (*DOT 1984). Probable lethal oral dose to humans 5 to 50 mg/kg or 7 drops to 1 teaspoon for 150 lb. person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use dry chemical, carbon dioxide, water spray, or foam. Dike fire control water for later disposal, do not scatter the material (*DOT 1984).

Special Fire Fighting Procedures: Stay at maximum distance (*DOT 1984).

Unusual Fire and Explosion Hazards: May release nitrogen oxides (Sax 1984, p. 1152). Containers may explode in heat of fire (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Under neutral or acid conditions (*Spencer 1982)

CARBOFURAN

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Alkalies (*Merck 1976)

Hazardous Decomposition or Byproducts: Nitrogen oxides (Sax 1984, p. 1152)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide on corn, alfalfa, tobacco and other field crops (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE

(Steps to be Taken in Case Material is Released or Spilled)

In case of releases or spills, stay upwind; keep out of low areas. Ventilate closed spaces before entering them (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CARBOFURAN

(1563-66-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White crystalline solid.

Odor - None.

Commercial Forms - 2, 3, 5 and 10% pure granules; 75% pure wettable powder; flowable paste.

Use - Pesticide.

Other Names - Bay 70143; Brifur; carbamic acid, methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester; Curaterr; Furadan; Yaltox.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, diazepam, phenytoin, protopam.

Signs and Symptoms of Acute Carbofuran Exposure:

Acute exposure to carbofuran usually leads to a cholinergic crisis. Signs and symptoms may include increased salivation, lacrimation (tearing), and spontaneous defecation and urination. Pinpoint pupils, along with blurred vision, tremor, muscle twitching, convulsions, mental confusion, and coma may also occur. Gastrointestinal effects include nausea, vomiting, diarrhea, and abdominal pain.

CARBOFURAN

Bradycardia (slow heart rate) occurs frequently. Muscle coordination may be diminished. Dyspnea (shortness of breath) may lead to respiratory collapse.

Emergency Life-Support Procedures:

Acute exposure to carbofuran may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to carbofuran.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to carbofuran.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

CARBOFURAN

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of carbofuran is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of carbofuran may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MERCURIC ACETATE

CAS Registry Number: 1600-27-7

Synonyms: Acetic Acid, Mercury(2+) Salt; Bis(acetyloxy)Mercury; Diacetoxymercury; Mercuriacetate; Mercuric Diacetate; Mercury (II) Acetate; Mercury Acetate; Mercury Diacetate; Mercury(2+) Acetate; Mercuryl Acetate

Chemical Formula: $Hg(C_2H_3O_2)_2$

Molecular Weight: 318.70

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 23.9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Mercury Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes (Merck 1983, p. 839)

Specific Gravity (H_2O=1): 3.270 (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: 352-356°F, 178-180°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 25 g/100 mL of water at 10°C, 100 g/100 mL of water at 100°C (*Weast 1979)

Appearance and Odor: White scales or powder (*Weast 1979); crystals or crystalline powder with a slight acetic odor (Merck 1983, p. 839); white

MERCURIC ACETATE

SECTION II (continued)

solid with a mild vinegar-like odor (Weiss 1980, p. 579)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Mercury and inorganic compounds) Ceiling 0.1 mg/m^3, as mercury (NIOSH 1987, p. 152)

ACGIH TLV: (Aryl and inorganic compounds) TWA 0.1 mg/m^3, as mercury (skin) (ACGIH 1986-87, p. 22)

IDLH: Not Found

Other Limits Recommended: (Mercury and inorganic compounds) NIOSH: 0.05 mg/m^3 10-hour TWA, as mercury (NIOSH 1987, P. 152)

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 653)
Skin: Yes (Hawley 1981, p. 653)
Ingestion: Yes (Sax 1984, p. 174)

Health Hazards (Acute, Delayed, and Chronic): It may cause death by hypovolemic shock or kidney failure. Chronic exposure may lead to kidney failure (*Gilman 1980, *Clayton and Clayton 1981-82).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not flammable (Weiss 1980, p. 579). Extinguish fire using agent suitable for type of surrounding fire. Material itself does not burn or burns with difficulty. Use water in flooding quantities as fog. Use foam, carbon dioxide or dry chemical to extinguish fires (Student 1981, p. 324).

Special Fire Fighting Procedures: Avoid breathing dusts, and fumes from burning material. Keep upwind. Avoid bodily contact with the material. Wear boots, protective gloves, and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Wear self-contained breathing apparatus when fighting fires involving this material. If contact with the material is anticipated, wear full protective clothing (Student 1981, p. 324).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of mercury (Sax 1984, p. 1747).

NFPA Flammability Rating: Not Found

MERCURIC ACETATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 579)

Conditions to Avoid: Light (Sax 1984, p. 1747)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of mercury (Sax 1984, p. 1747).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chiefly for mercuration of organic compounds; for the absorption of ethylene (Merck 1983, p. 839), as a chemical intermediate for phenylmercuric acetate, a mildewicide, and other organomercury compounds (*SRI); catalyst in organic synthesis; and in the manufacture of pharmaceuticals (Hawley 1981, p. 653)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing dusts (see Section III above).
If material is not involved in fire, keep material out of water sources and sewers (Student 1981, p. 324). Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for MERCURIC ACETATE

(1600-27-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - White crystals or white to yellow powder.

Odor - Mild, vinegarlike.

Commercial Forms - Crystals or powder shipped in glass, earthenware, composition bottles or jars, metal packaging, fiber cartons, cans, and boxes.

Uses - Pesticide, manufacture of pharmaceuticals, mercuration of organic compounds, absorption of ethylene, catalyst.

Materials to Avoid - Reducing agents.

Caution: *Avoid sources of heat including fire. Mercuric acetate will liberate toxic mercury fumes when heated to decomposition.*

Other Names - Diacetoxymercury, mercuriacetate, mercury diacetate, mercuryl acetate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, penicillamine, dimercaprol.

MERCURIC ACETATE

Signs and Symptoms of Acute Mercuric Acetate Exposure:

Warning: *Effects may be delayed. Caution is advised.*

Signs and symptoms of acute exposure to mercuric acetate may be severe and include increased salivation, foul breath, inflammation and ulceration of the mucous membranes, abdominal pain, and bloody diarrhea. Oliguria (scanty urination), anuria (suppression of urine formation), and acute renal failure may be noted. Weak pulse, seizures, psychic disturbances, dyspnea (shortness of breath), chest pain, and circulatory collapse may be observed. Dermal exposure may result in dermatitis (red inflamed skin).

Emergency Life-Support Procedures:

Acute exposure to mercuric acetate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to mercuric acetate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to mercuric acetate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

MERCURIC ACETATE

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas for at least 15 minutes with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHANESULFONYL CHLORIDE, 2-CHLORO-

CAS Registry Number: 1622-32-8

Synonyms: (SANSS 1983 Synonyms) beta-Chloroethanesulfonyl Chloride; 2-Chloroethane Sulfochloride; 2-Chloroethanesulfonic Acid Chloride; 2-Chloroethanesulfonyl Chloride; 2-Chloroethylsulfonyl Chloride

Chemical Formula: $C_2H_4Cl_2O_2S$

Molecular Weight: 163

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.25 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 392-397°F, 200-203°C (Weast 1978, p. C-295)

Specific Gravity (H_2O=1): 1.55 at 20°C/4°C (Weast 1978, p. C-295)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water (Weast 1978, p. C-295)

Appearance and Odor: Not Found

ETHANESULFONYL CHLORIDE, 2-CHLORO-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

ETHANESULFONYL CHLORIDE, 2-CHLORO-

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS:

Sources searched but no information found:

NIOSH/RTECS 1983
ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
Sax 1984
DOT 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIETHYLCARBAMAZINE CITRATE

CAS Registry Number: 1642-54-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, page 185)
1-Piperazinecarboxamide, N,N-Diethyl-4-Methyl-, Citrate (1:1); Banocide; Caricide; Caritrol; Cypip; Dicarocide; Diethylcarbamazine Acid Citrate; Diethylcarbamazane Citrate; Diethylcarbamazine Hydrogen Citrate; 1-Diethylcarbamoyl-4-Methylpiperazine Dihydrogen Citrate; N,N-Diethyl-4-Methyl-1-Piperazinecarboxamide Citrate; N,N-Diethyl-4-Methyl-1-Piperazinecarboxamide Dihydrogen Citrate; Ditrazin; Ditrazine; Ethodryl Citrate; Franocide; Franozan; Hetrazan; Loxuran; 1-Piperazinecarboxamide, N,N-Diethyl-4-Methyl-, 2-Hydroxy-1,2,3-Propanetricarboxylate

Chemical Formula: $C_{10}H_{21}N_3O \cdot C_6H_8O_7$

Molecular Weight: 391.48

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.309 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 286-289°F, 141-143°C (Merck 1983, p. 453)

Vapor Density (AIR=1): Not Found

DIETHYLCARBAMAZINE CITRATE

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Merck 1983, p. 453)

Appearance and Odor: Crystalline solid (Merck 1983, p. 453); scored white tablets (Physician's Desk Reference, 1980, p. 979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1006)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Drugs, n.o.s.) May be fatal if inhaled, swallowed or absorbed through skin. 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 (DOT 1984, Guide 11). The average adult man tolerates a single dose of 1.5 gm without ill effects (Gosselin 1984, p. II-388).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

DIETHYLCARBAMAZINE CITRATE

SECTION V (continued)

Conditions to Avoid: Decomposing heat (Sax 1984, p. 1006)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1006).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used against filariasis in man and animals. Especially popular in veterinary medicine (Gosselin 1984, p. II-388).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Drugs, n.o.s.) Shut off ignition sources; no flares, smoking or flames in hazard area. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 11).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Untoward reactions include nausea, vomiting, headache, weakness, and (as seen in dogs) muscle tremors and convulsions (Gosselin 1984, p. II-388).

Emergency and First Aid Procedures: (Non-Specific -- Drugs, n.o.s.) Move victim to fresh air; 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

DIETHYLCARBAMAZINE CITRATE

SECTION IX (continued)

for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 11).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ACETONE THIOSEMICARBAZIDE

CAS Registry Number: 1752-30-3

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 233) Acetone, Thiosemicarbazone; Hydrazinecarbothioamide, 2-(1-Methylethylidene)-; Thiosemicarbazone Acetone

Chemical Formula: $C_4H_9N_3S$

Molecular Weight: 131.22

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

ACETONE THIOSEMICARBAZIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1985, p. 2576)

Health Hazards (Acute, Delayed, and Chronic): High oral toxicity (Sax 1984, p. 2576).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and sulfur oxides (Sax 1984, p. 2576).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2576)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and sulfur oxides (Sax 1984, p. 2576).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not found

ACETONE THIOSEMICARBAZIDE

SECTION V (continued)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Weast 1979
Merck 1983
Hawley 1981
Hayes 1982
Farm Chemicals Handbook 1984
Encyc Occupat Health and Safety 1983
Verschueren 1983
Gosselin 1984
Clayton and Clayton 1981-82
DOT 1984
Student 1981
Buchel 1983
Weiss 1980
CHRIS 1978
DOT 1984
NFPA 1984
Doull 1980
Arena 1979

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PARAQUAT

CAS Registry Number: 1910-42-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 719) 4,4'-Bipyridinium, 1,1'-Dimethyl-, Dichloride; Bipyridinium, 1,1'-Dimethyl-4,4'-, Dichloride; Crisquat; Dextrone-X; Dexuron; N,N'-Dimethyl-4,4'- Bipyridynium Dichloride; N,N'-Dimethyl-4,4'-Bipyridylium Dichloride; 1,1'-Dimethyl-4,4'-Bipyridynium Dichloride; 4,4'-Dimethyldipyridyl Dichloride; 1,1'-Dimethyl-4,4'-Dipyridylium Chloride; N,N'-Dimethyl-4,4'-Dipyridylium Dichloride; Esgram; Gramonol; Gramoxone; Gramoxone S; Gramuron; Methylviologen; Methyl Viologen (Reduced); Ortho Paraquat Cl; Para-Col; Paraquat Chloride; Paraquat Cl; Paraquat, Dichloride; Pathclear; Pillaquat; Pillarxone; Terraklene; Totacol; Toxer Total; Viologen, Methyl-; Weedol

Chemical Formula: $C_{12}H_{14}N_2 \cdot 2Cl$

Molecular Weight: 257.18

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (guinea pig) 22 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Approximately 0 (NIOSH/OSHA 1978, p. 146)

Melting Point: Decomposes 572°F, 300°C (Merck 1983, p. 1009)

Vapor Density (AIR=1): Not Found

PARAQUAT

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble in water (ACGIH 1980, p. 319)

Appearance and Odor: Colorless to yellow crystalline solid (Farm Chemicals Handbook 1984, p. C172; Merck 1983, p. 1009)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Paraquat compounds) TWA 0.5 mg/m^3 (NIOSH 1987, p. 184)

ACGIH TLV: (Respirable sizes) TWA 0.1 mg/m^3 (ACGIH 1986-87, p. 26)

IDLH: 1.5 mg/m^3 (NIOSH/OSHA 1978, p. 146)

Other Limits Recommended: Maximum air concentration (Bulgaria) 0.01 mg/m^3 (Encyc Occupat Health and Safety 1983, p. 1037)

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 776)
Skin: Yes (Hawley 1981, p. 776)
Ingestion: Yes (Farm Chemicals Handbook 1984, p. C172)

Health Hazards (Acute, Delayed, and Chronic): Can cause death due to severe injury to the lungs (Sax 1984, p. 2117). The lowest lethal oral dose reported in humans is 43 mg/kg (NIOSH/RTECS 1983, p. 719).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material is a bipyridilium compound (Buchel 1983, p. 376). Procedures for bipyridilium pesticides are as follows. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

PARAQUAT

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1978, p. 146).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Contact herbicide and desiccant (Farm Chemicals Handbook 1984, p. C172).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Bipyridilium Pesticide) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorities. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PARAQUAT

(1910-42-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to yellow crystalline solid.

Uses - Herbicide, desiccant.

Materials to Avoid - Strong oxidizers, alkali, metals.

Other Names - 1,1'-Dimethyl-4,4'-bipyridinium dichloride; methylviologen; paraquat dichloride; Pathclear; Terraklene; Weedol.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Paraquat Exposure:

Warning: *Effects occur in two stages, immediate and delayed. Caution is advised. Exposure to paraquat may be fatal; there is no effective antidote.*

Signs and symptoms of acute exposure to paraquat may be severe and include nausea, vomiting, diarrhea, and abdominal pain. A burning sensation of the mouth and esophagus with possible ulceration may occur following ingestion. Eye exposure may result in corneal opacification (cloudiness). Dermatitis and nail atrophy may occur following dermal contact.

Delayed effects include transient reversible liver injury, acute renal failure, and progressive pulmonary fibrosis with associated dyspnea (shortness of breath) and pulmonary edema.

PARAQUAT

Emergency Life-Support Procedures:

Acute exposure to paraquat may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to paraquat.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to paraquat.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

7. RUSH to a health care facility.

PARAQUAT

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of paraquat is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROXURON

CAS Registry Number: 1982-47-4

Synonyms: Urea, 3-(p-(p-Chlorophenoxy)Phenyl)-1,1-Dimethyl-; 3-(p-(p-Chlorophenoxy)Phenyl)-1,1-Dimethylurea; C1983; Chloroxifenidim; CIBA 1983; N'-4-(4-Chlorophenoxy)Phenyl-N,N-Dimethylurea; Norex; Tenoran; Urea, N'-(4-(4-Chlorophenoxy)Phenyl)-N,N-Dimethyl-

Chemical Formula: $C_{15}H_{15}ClN_2O_2$

Molecular Weight: 290.7

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (dog) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.34 at 20°C (Worthing 1983)

Vapor Pressure (mmHg): 0.0000000018 at 20°C (Worthing 1983, p. 121)

Melting Point: 304-306°F, 151-152°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 3.7 mg/liter at 20°C and pH 7 (*Spencer 1973)

Appearance and Odor: Colorless powder (Worthing 1983). White crystals (*Spencer 1973). Odorless (*Weed Science Society of America 1979).

CHLOROXURON

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 753)

Health Hazards (Acute, Delayed, and Chronic): This is highly toxic by ingestion (Sax 1984, p. 753). Under certain conditions, chloroxuron will form carcinogenic dimethylnitrosamine (*Egert and Greim, Food Cosmetic Toxicology 14(3)193(1976)).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Non-flammable (*Weed Science Society of America 1979)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Avoid breathing vapors or dust. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: (Non-Specific -- Pesticide, Solid, n.o.s.) Fire may produce irritating or poisonous gases (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Spencer 1973)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it

CHLOROXURON

SECTION V (continued)

emits very toxic fumes of chlorides and nitrogen oxides (Sax 1984, p. 753).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Selective pre- and early post-emergence herbicide in soybeans, strawberries, various vegetable crops and ornamentals (*Spencer 1973). Root- and foliage-absorbed herbicide selective in leek, celery, onion, carrot and strawberry (Buchel 1983, p. 353). Herbicidal urea (Hayes 1982, p. 540). Selective herbicide (Farm Chemicals Handbook 1984, p. C-220).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 53). Use caution with this material (Farm Chemicals Handbook 1984, p. C-220).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Safest decontaminant is water with soap. If any question of exposure, skin decontamination should be thorough. Eye exposure: irrigate eyes with plain tap water (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- VALINOMYCIN

CAS Registry Number: 2001-95-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, page 905) Antibiotic N-329 B; Valinomicin

Chemical Formula: $C_{54}H_{90}N_6O_{18}$

Molecular Weight: 1111.50

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 2.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 374°F, 190°C (Merck 1983, p. 1417)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (Merck 1983, p. 1417)

Appearance and Odor: Shiny crystalline solid (Merck 1983, p. 1417)

VALINOMYCIN

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2717)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic orally (Sax 1984, p. 2717).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 2717).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

VALINOMYCIN

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Nitrogen oxides (Sax 1984, p. 2717)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide and nematocide (Merck 1983, p. 1417). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Move victim to fresh air; 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

VALINOMYCIN

SECTION IX (continued)

clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 55).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHIOCARB

CAS Registry Number: 2032-65-7

Synonyms: 3,5-Dimethyl-4-(Methylthio)Phenol Methylcarbamate; 3,5-Dimethyl-4-(Methylthio)Phenyl Methylcarbamate; 3-5-Dimethyl-4-Methylmercaptophenyl-N-Methylcarbamate; 3,5-Dimethyl-4-Methylthiophenyl N-Methylcarbamate; 3,5-Xylenol, 4-(Methylthio)-, Methylcarbamate; 4-(Methylthio)-3,5-Xylyl Methylcarbamate; 4-Methylmercapto-3,5-Dimethylphenyl N-Methylcarbamate; 4-Methylmercapto-3,5-Xylyl Methylcarbamate; 4-Methylthio-3,5-Dimethylphenyl Methylcarbamate; B 37344; Bay 37344; Bay 5024; Bay 9026; Bayer 37344; Carbamic Acid, Methyl-, 3,5-Dimethyl-4-(Methylthio)Phenyl Ester; Carbamic Acid, Methyl-,4-(ethylthio)-3,5-Xylyl Ester; DCR 736; DRAZA; ENT 25,726; H 321; Mesurol; Methyl Carbamic Acid 4-(Methylthio)-3,5-Xylyl Ester; Metmercapturon; OMS-93; Phenol, 3,5-Dimethyl-4-(Methylthio)-, Methylcarbamate; SD 9228

Chemical Formula: $C_{11}H_{15}NO_2S$

Molecular Weight: 225.3

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 15 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.0001 (Farm Chemicals Handbook 1984, p. C145)

Melting Point: 243°F, 117°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

METHIOCARB

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.0027 g/100 g water (*Farm Chemicals Handbook 1984)

Appearance and Odor: White crystalline powder (*Spencer 1982). Mild odor (*Farm Chemicals Handbook 1984).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1177)
Skin: Yes (Sax 1984, p. 1177)
Ingestion: Yes (Sax 1984, p. 1177)

Health Hazards (Acute, Delayed, and Chronic): As a carbamate insecticide, this compound is a reversible cholinesterase inhibitor and acts on the nervous system. It is classified as very toxic, and the probable oral lethal dose for humans is 50-500 mg/kg or between 1 teaspoon and 1 ounce for a 150 lb. adult (Gosselin 1984, p. II-307).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is a carbamate insecticide (Encyc Occupat Health and Safety 1983, p. 1624). Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is a solid carbamate insecticide (Buchel 1983, p. 129). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

METHIOCARB

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen and sulfur oxides (Sax 1984, p. 1177).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide and immobilizing agent for birds (*Rossoff 1974), acaricide and molluscicide (*Worthing 1979)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation of material (see Section III above). This compound is a solid carbamate insecticide (Buchel 1983, p. 129). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

METHIOCARB

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include salivation, slowed heartbeat, spontaneous urination and defecation, labored breathing, headache, blurred vision, tremor, slight paralysis, and muscle twitching. In severe poisoning, unconsciousness and convulsions may occur. Nausea, vomiting, diarrhea, and abdominal pain may be noted (*Rumack 1975 to Present).

Emergency and First Aid Procedures: This compound is a solid carbamate insecticide (Buchel 1983, p. 129). Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PARAQUAT METHOSULFATE

CAS Registry Number: 2074-50-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 719) 4,4'-Bipyridinium, 1,1'-Dimethyl-, bis(Methyl Sulfate); 1,1'-Dimethyl- 4,4'-Bipyridynium Dimethylsulfate; 1,1'-Dimethyl-4,4'-Dipyridinium Di(Methyl Sulfate); Gramoxone Methyl Sulfate; Paraquat bis(Methyl Sulfate); Paraquat Dimethyl Sulfate; Paraquat Dimethyl Sulphate; PP 910

Chemical Formula: $C_{12}H_{14}N_2 \cdot (CH_3O_4S)_2$

Molecular Weight: 408.48

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (dog) 25 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes at 347-356°F, 175-180°C (NIOSH/OSHA 1978, p. 146)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Approximately 0 (NIOSH/OSHA 1978, p. 146)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Hawley 1981, p. 776)

PARAQUAT METHOSULFATE

SECTION II (continued)

Appearance and Odor: White crystalline solid (Farm Chemicals Handbook 1984, p. C172); yellow solid (Merck 1983, p. 1009)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Paraquat compounds) 0.5 mg/m^3 (NIOSH 1987, p. 184)

ACGIH TLV: (For Paraquat) TWA 0.1 mg/m^3 (respirable sizes) (ACGIH 1985, p. 26)

IDLH: (Paraquat compounds) 1.5 mg/m^3 (NIOSH 1987, p. 184)

Other Limits Recommended: Maximum Air Concentration (Bulgaria) 0.01 mg/m^3; TLV: 0.1 mg/m^3 (respirable sizes) (Encyc Occupat Health and Safety 1983, p. 1037)

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 776)
Skin: Yes (Hawley 1981, p. 776)
Ingestion: Yes (Sax 1984, p. 2118)

Health Hazards (Acute, Delayed, and Chronic): It can cause death by shock and/or pulmonary damage. The fatal dose is estimated to be 6 grams of paraquat ion. Exposure may cause renal tubular damage and liver dysfunction (Encyc Occupat Health and Safety 1983, p. 1037).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not combustible (NIOSH/OSHA 1978, p. 146). (Non-Specific -- Pesticide, Solid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of sulfur oxides and nitrogen oxides (Sax 1984, p. 2118).

NFPA Flammability Rating: Not Found

PARAQUAT METHOSULFATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1978, p. 146)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of sulfur oxides and nitrogen oxides (Sax 1984, p. 2118).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Contact herbicide and desiccant (Farm Chemicals Handbook 1984, p. C172).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Death may occur in 24 hours or less. Contact causes irritation. Inhalation causes nose bleeds, headaches, coughing, and a sore throat. Swallowing causes burning in mouth, throat, and abdomen, vomiting, bloody vomitus, diarrhea with bloody stools, and headaches (NIOSH/OSHA 1978, p. 146; Hayes 1982, p. 552; Encyc Occupat Health and Safety 1983, p. 1037; Gosselin 1984, p. III-333).

PARAQUAT METHOSULFATE

SECTION IX (continued)

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, Solid, n.o.s.) 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 (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENYLSILATRANE

CAS Registry Number: 2097-19-0

Synonyms: 2,8,9-Trioxa-5-Aza-1-Silabicyclo[3.3.3] Undecane, Phenyl-; Silatrane, Phenyl-

Chemical Formula: $C_{12}H_{17}NO_3Si$

Molecular Weight: 251.39

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 1 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

PHENYLSILATRANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2203)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic following ingestion by mouth (Sax 1984, p. 2203).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Decomposes to toxic fumes of nitrogen oxides when heated (Sax 1984, p. 2203).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 2203).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Toxic fumes of nitrogen oxides when heated to decomposition (Sax 1984, p. 2203).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PHENYLSILATRANE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:
Clayton and Clayton 1981-82
Merck 1983
Verschueren 1983
Weast 1979
Student 1981
Hawley 1981
DOT 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- EPN

CAS Registry Number: 2104-64-5

Synonyms: Phosphonothioic Acid, Phenyl-, O-Ethyl O-(p-Nitrophenyl)Ester; Benzenephosphonic Acid, Thiono-, Ethyl-p-Nitrophenyl Ester; Benzenephosphothionic Acid, Ethyl 4-Nitro-Phenyl Ester; ENT 17,798; EPN 300; Ethoxy-4-Nitrophenoxyphenylphosphine Sulfide; Ethyl p-Nitrophenyl Benzenethionophosphonate; Ethyl p-Nitrophenyl Benzenethiophosphate; Ethyl p-Nitrophenyl Benzenethiophosphonate; Ethyl p-Nitrophenyl Phenylphosphonothioate; Ethyl p-Nitrophenyl Thionobenzenephosphate; Ethyl p-Nitrophenyl Thionobenzenephosphonate; O-Ethyl O-(4-Nitrophenyl) Benzenethionophosphonate; O-Ethyl O-(4-Nitrophenyl) Phenylphosphonothioate; O-Ethyl O-(p-Nitrophenyl) Phenylphosphonothioate; O-Ethyl O-p-Nitrophenyl Benzenethiophosphonate; O-Ethyl O-p-Nitrophenyl Phenylphosphonothiolate; O-Ethyl O-p-Nitrophenyl Phenylphosphorothioate; O-Ethyl Phenyl p-Nitrophenyl Thiophosphonate; Phenol, p-Nitro-, O-Ester with O-Ethyl Phenyl Phosphonothioate; Phenylphosphonothioate, O-Ethyl-O-p-Nitrophenyl-; Phosphonothioic Acid, Phenyl-, O-Ethyl O-(4-Nitrophenyl) Ester; PIN; Santox

Chemical Formula: $C_{14}H_{14}NO_4PS$

Molecular Weight: 323.30

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.268 at 77°F, 25°C (*Merck 1976)

Vapor Pressure (mmHg): 0.0003 at 212°F, 100°C (*Worthing 1979)

EPN

SECTION II (continued)

Melting Point: 97°F, 36°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Merck 1976)

Appearance and Odor: Light yellow crystalline powder (*Worthing 1979); aromatic odor (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.5 mg/m^3 (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.5 mg/m^3 (skin) (ACGIH 1986-87, p. 18)

IDLH: 50 mg/m^3 (NIOSH/OSHA 1978, p. 94)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Farm Chemicals Handbook 1983)
Skin: Yes (*Farm Chemicals Handbook 1983)
Ingestion: Yes (*Farm Chemicals Handbook 1983)

Health Hazards (Acute, Delayed, and Chronic): This material may be fatal if swallowed. It is poisonous if inhaled and extremely hazardous by skin contact. Repeated exposure may, without symptoms, be increasingly hazardous (*Farm Chemicals Handbook 1983). The estimated fatal oral dose is 0.3 grams for a 150 lb. (70 kg) person (*Arena 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

EPN

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*ACGIH 1980)

Conditions to Avoid: Hydrolyzed by alkali (*Worthing 1979)

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1978, p. 94)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide for cotton (*SRI) and an acaricide (*Worthing 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill. Cover with soda ash, mix, and spray with water. Place in container of water and allow to stand for 2 days, then neutralize with 6 molar hydrochloric acid (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

EPN

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for EPN

(2104-64-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Light yellow, crystalline powder.

Odor - Aromatic.

Commercial Forms - Dark amber-colored liquid, wettable powders and dusts.

Use - Pesticide.

Materials to Avoid - Strong oxidizers, alkali.

Other Names - Ethyl p-nitrophenyl benzenethiophosphate, PIN, Santox.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute EPN Exposure:

Warning: *Extremely hazardous by skin contact. Effects may be delayed up to 12 hours. Caution is advised.*

Acute exposure to EPN may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

EPN

The heart rate may decrease following oral exposure or increase following dermal exposure. Hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression and respiratory paralysis. Giddiness, slurred speech, confusion, and psychosis may also be observed.

Emergency Life-Support Procedures:

Acute exposure to EPN may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to EPN.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to EPN.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

EPN

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of EPN is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of EPN may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CADMIUM STEARATE

CAS Registry Number: 2223-93-0

Synonyms: Octadecanoic Acid, Cadmium Salt; Alaixol 11; Cadmium Distearate; Cadmium Octadecanoate; SCD; Stabilisator SCD; Stabilizer SCD; Stearic Acid, Cadmium Salt

Chemical Formula: $C_{36}H_{72}O_4Cd$

Molecular Weight: 681.48

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.13 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Cadmium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

CADMIUM STEARATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: (Cadmium dusts and salts) TWA 0.05 mg/m^3, as cadmium (ACGIH 1986-87, p. 11)

IDLH: Not Found

Other Limits Recommended: IDLH for cadmium dust 40 mg/m^3 (NIOSH/OSHA 197 p. 58)

Routes of Entry: **Inhalation:** Yes (Similar to cadmium) (*Rumack 1975 to Present)
Skin: Not Found
Ingestion: Yes (Similar to cadmium) (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Similar to cadmium; acute toxicity most notably occurs secondary to cadmium ingestion or inhalation of cadmium fumes. Poisoning from inhalation is relatively rare but dangerous, having a mortality rate of about 15 percent (*Rumack 1975 to Present). Toxic inhaled concentrations in humans have been reported at 147 mg/m^3/35 minutes and at 1800 mg/m^3/2 years (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Cadmium Compound) For small fires, use dry chemicals, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Cadmium Compound) Keep upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: It emits acrid smoke when heated to decomposition (Sax 1984, p. 2079).

NFPA Flammability Rating: Not Found

CADMIUM STEARATE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke (Sax 1984, p. 2079).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Lubricant and stabilizer for polyvinyl chloride (*SRI). Lubricant and stabilizer in plastics (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Cadmium Compounds) Do not touch spilled material. Stay upwind; keep out of low areas. Take up small spills with sand or other noncombustible absorbent material and place into containers for later disposal. Take up small, dry spills with clean shovel and place into clean, dry container. Dike far ahead of large spills for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CADMIUM STEARATE

(2223-93-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White powder.

Odor - Fatty acidlike.

Commercial Form - Powder in drums.

Uses - Lubricant, stabilizer for plastics.

Other Names - Alaixol 11; cadmium octadecanoate; Stabilizer SCD; stearic acid, cadmium salt.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, EDTA.

Signs and Symptoms of Acute Cadmium Stearate Exposure:

Warning: *Effects may be delayed for several hours. Caution is advised.*

The following signs and symptoms may be noted following exposure to cadmium stearate: cough, dyspnea (shortness of breath), either dry mouth or increased salivation, abdominal pain, nausea, vomiting, bronchitis, and chest pain. Vertigo (dizziness), fever, and profuse sweating may also occur.

CADMIUM STEARATE

Emergency Life-Support Procedures:

Acute exposure to cadmium stearate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to cadmium stearate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to cadmium stearate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

CADMIUM STEARATE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of cadmium stearate is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THIOCARBAZIDE

CAS Registry Number: 2231-57-4

Synonyms: 1,3-Diamino-2-Thiourea; Carbohydrazide, Thio-; Carbonothioic Dihydrazide; Hydrazinecarbohydrazonothioic Acid; TCH; Thiocarbohydrazide; Thiocarbonic Dihydrazide; Thiocarbonohydrazide; USAF EK-7372

Chemical Formula: CH_6N_4S

Molecular Weight: 106.17

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 338°F, 170°C -- decomposes (Weast 1979, p. C-239)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Weast 1984, p. C-219)

Appearance and Odor: Crystalline needles and plates (Weast 1979, p. C-239)

THIOCARBAZIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2568)

Health Hazards (Acute, Delayed, and Chronic): High oral toxicity (Sax 1984, p. 2568)

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poisonous Solid, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Stay upwind, keep out of low areas. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits very toxic fumes of nitrogen oxides and sulfur oxides (Sax 1984, p. 2568).

THIOCARBAZIDE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Has been tested as a fungicide and pesticide (*Peer Review Committee). It is used in electron microscopy to produce electron-opaque deposits for ultrastructural analysis (*Hoch H.C.; Planta 147(3) 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Solid, n.o.s.) Do not touch spilled material. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Treat as for general poisoning. Establish respiration. Prevent absorption. Decontaminate exposed skin with water and soap. For eye exposure, flush thoroughly with water (*Rumack 1975 to Present). (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with the material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIGLYCIDYL ETHER

CAS Registry Number: 2238-07-5

Synonyms: bis(2,3-Epoxypropyl) Ether; DGE; Di(2,3-Epoxy)Propyl Ether; Ether, bis(2,3-Epoxypropyl); Glycidyl Ether; NSC 54739; Oxirane, 2,2'-(Oxybis(Methylene))bis-

Chemical Formula: $C_6H_{10}O_3$

Molecular Weight: 130.16

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.16 mg/liter/4 hours (*NIOSH/RTEC 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 500°F, 260°C (*Patty 1963)

Specific Gravity (H_2O=1): 1.262 at 25°C/4°C (*Patty 1963)

Vapor Pressure (mmHg): 0.09 at 25°C (*Patty 1963)

Melting Point: Not Found

Vapor Density (AIR=1): 3.78 at 25°C (*Patty 1963) (SUSPECT)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Colorless liquid with a pronounced irritant odor (*Patty 1963).

DIGLYCIDYL ETHER

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 0.5 ppm (2.8 mg/m^3) (NIOSH 1987, p. 104)

ACGIH TLV: 0.1 ppm (0.5 mg/m^3) (ACGIH 1983, p. 18)

IDLH: 85 ppm (NIOSH/OSHA 1978, p. 86)

Other Limits Recommended: NIOSH: 0.1 mg/m^3 15-minute ceiling (NIOSH 1987, p. 104). NIOSH occupational carcinogen (NIOSH 1987, p. 104)

Routes of Entry: **Inhalation:** Yes (*Sax 1979)
Skin: Yes (*Sax 1979)
Ingestion: Yes (*Sax 1979)

Health Hazards (Acute, Delayed, and Chronic): This compound can cause death or permanent injury via oral and inhalation routes during exposure that comes from normal use. It is incapacitating and poisonous and requires special handling. It can cause considerable discomfort by the dermal route (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 147.2°F, 64.0°C (Encyc Occupat Health and Safety 1983, p. 787)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Poison, Flammable Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 57).

Special Fire Fighting Procedures: (Non-Specific -- Poison, Flammable Liquid, n.o.s.) Move container from fire area if you can do so without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 57).

Unusual Fire and Explosion Hazards: (Non-Specific -- Poison, Flammable Liquid, n.o.s.) May be ignited by heat, sparks, or flames. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers (DOT 1984, Guide 57).

NFPA Flammability Rating: Not Found

DIGLYCIDYL ETHER

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1978, p. 86).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a reactive diluent for epoxy resins; chemical intermediate; stabilizer of chlorinated organic compounds; a textile-treating agent (*Patty 1963).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poison, Flammable Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 57).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

DIGLYCIDYL ETHER

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Irritation of the eyes and respiratory tract, skin damage, and skin burns (ACGIH 1980, p. 143; *Patty 1963).

Emergency and First Aid Procedures: (Non-Specific -- Poison, Flammable Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 57).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROTHOATE

CAS Registry Number: 2275-18-5

Synonyms: Phosphorodithioic Acid, O,O-Diethyl Ester, S-Ester with N-Isopropyl-2-Mercaptoacetamide; Trimethoate; AC 18682; Acetamide, N-Isopropyl-2-Mercapto-, S-Ester with O,O-Diethyl Phosphorodithioate; American Cyanamid 18,682; EI 18682; ENT 24,652; FAC; FAC 20; FAK-40; Fostion; Isopropyl Diethyldithiophosphorylacetamide; L 343; N-Monoisopropylamide of O,O-Diethyldithiophosphorylacetic Acid; O,O-Diethyl Phosphorodithioate S-Ester with N-Isopropyl-2-Mercaptoacetamide; O,O-Diethyl S-(N-Isopropylcarbamoyl-methyl) Dithiophosphate; O,O-Diethyl S-(N-Isopropylcarbamoylmethyl) Phosphorodithioate; O,O-Diethyl S-Isopropylcarbamoylmethyl Phosphorodithioate; O,O-Diethyldithiophosphorylacetic Acid, N-Monoisopropylamide; Oleofac; Phosphorodithioic Acid, O,O-Diethyl Ester, S-Ester with N-Isopropyl-2-Mercaptoacetamide; Phosphorodithioic Acid, O,O-Diethyl S-(2-((1-Methylethyl) Amino)-2-Oxoethyl) Ester; Prothoat; Telefos

Chemical Formula: $C_9H_{20}NO_3PS_2$

Molecular Weight: 285.40

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.165 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.151 at 32°C (*Worthing 1979)

Vapor Pressure (mmHg): 0.0001 at 40°C (*Worthing 1979)

Melting Point: 83.3°F, 28.5°C; technical product solidifies at 70-75°F, 21-24°C (*Worthing 1979).

PROTHOATE

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 2.5 g/liter at 68°F, 20°C (*Worthing 1979)

Appearance and Odor: Colorless crystalline solid, camphor-like odor. Technical product is amber to yellow semi-solid (*Worthing 1979).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide, n.o.s.) (DOT 1984, Guide 55)
Skin: Yes (*Sax 1979)
Ingestion: Yes (*Sax 1979)

Health Hazards (Acute, Delayed, and Chronic): This is a highly toxic material capable of causing death or permanent injury due to exposures during normal use. Small doses at frequent intervals are additive. Similar to parathion (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

PROTHOATE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Spencer 1982)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is an insecticide (*SRI) and an acaricide (*Worthing 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PROTHOATE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, dizziness, weakness, muscle twitching, difficult breathing, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticides, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55). If material has been ingested, induce vomiting with ipecac (*Morgan 1982).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- OXYDISULFOTON

CAS Registry Number: 2497-07-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 141) Phosphorodithioic Acid, O,O-Diethyl S-((Ethylsulfinyl)Ethyl)Ester; O,O-Diethyl S-(2-Ethylsulfinyl)Ethyl Phosphorodithioate; Disyston S; Oxydemeton-Ethyl; Phosphorodithioic Acid, O,O-Diethyl S-[2-(Ethylsulfinyl) Ethyl) Ester; BAY 23323; DEPD; Disyston Sulfoxide; Disyston Sulphoxide; Ethylthiometon Sulfoxide

Chemical Formula: $C_8H_{19}O_3PS_3$

Molecular Weight: 290.42

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 12 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

OXYDISULFOTON

SECTION II (continued)

Solubility in Water: Not Found

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 2108)
Ingestion: Yes (Sax 1984, p. 2108)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic orally and through the skin (Sax 1984, p. 2108). This material is an organophosphate pesticide (Buchel, 1983, p. 178).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Poisonous gases may be generated from the fire or runoff water (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Some materials may burn but none of them ignite easily. Container may explode in the heat of fire (DOT 1984, Guide 55). When heated to decomposition, it emits very toxic fumes of oxides of sulfur and phosphorus (Sax 1984, p. 2108).

NFPA Flammability Rating: Not Found

OXYDISULFOTON

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of oxides of sulfur and phosphorus (Sax 1984, p. 2108)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Agricultural insecticide (Buchel 1983, p. 178).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Do not touch spilled material. 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 spill for later disposal (DOT 984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

OXYDISULFOTON

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Mild: headache, loss of appetite, nausea, dizziness. Moderate: abdominal cramps, diarrhea, salivation, excessive tearing, muscular cramps. Severe: fever, blue lips, lack of sphincter control, coma, heart shock, difficult breathing (ITII 1976, p. 205).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIMETHYL PHOSPHOROCHLORIDOTHIOATE

CAS Registry Number: 2524-03-0

Synonyms: Chlorodimethoxyphosphine Sulfide; Dimethoxy Thiophosphonyl Chloride; Dimethyl Chlorothionophosphate; Dimethyl Chlorothiophosphate; Dimethyl Thionophosphorochloridate; Dimethyl Thiophosphorochloridate; Methyl PCT; O,O-Dimethyl Chlorothionophosphate; O,O-Dimethyl Chlorothiophosphate; O,O-Dimethyl Phosphorochlorothioate; O,O-Dimethyl Phosphorothionochloridate; O,O-Dimethyl Thionophosphorochloridate; O,O-Dimethyl Thiophosphoric Acid Chloride; O,O-Dimethylphosphorochloridothioate; O,O-Dimethylthionophosphoryl Chloride; Phosphonothioic Acid, Chloro-, O,O-Dimethyl Ester; Phosphorochloridothioic Acid, O,O-Dimethyl Ester

Chemical Formula: $C_2H_6ClO_2PS$

Molecular Weight: 160.56

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} inhalation (mouse) 0.32 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 151-153°F, 66-67°C at 16 mmHg (*Hawley 1977)

Specific Gravity (H_2O=1): 1.320 at 25°C (*Hawley 1977)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

DIMETHYL PHOSPHOROCHLORIDOTHIOATE

SECTION II (continued)

Solubility in Water: Insoluble (*Hawley 1977)

Appearance and Odor: Colorless to light amber liquid (*Hawley 1977).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): This material is a strong irritant to the eyes, skin, and mucous membranes (*Hawley 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found.
UEL: Not Found

Extinguishing Methods: May react violently with water. Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 59).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do so without risk. Cool containers that are exposed to flames with water from the side until well after fire is out (DOT 1984, Guide 59).

Unusual Fire and Explosion Hazards: This material may burn but does not ignite readily. This material may ignite combustibles (wood, paper, oil, etc.) (DOT 1984, Guide 59).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

DIMETHYL PHOSPHOROCHLORIDOTHIOATE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated it emits very toxic fumes of chlorine containing compounds, phosphorus oxides, and sulfur oxides (Sax 1984, p. 1193).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a chemical intermediate for insecticides, pesticides, and fungicides; oil and gasoline additives; plasticizers; corrosion inhibitors; flame retardants; and flotation agents (*Hawley 1977). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). Apply powdered limestone, slaked lime, soda ash, or sodium bicarbonate (*CHRIS 1978). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike spill for later disposal (DOT 1984, Guide 59).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIMETHYL PHOSPHOROCHLORIDOTHIOATE

(2524-03-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to light amber liquid.

Use - Chemical intermediate for pesticides, flame retardants, other substances.

Material to Avoid - Water (except for use in emergency life support).

Caution: *Avoid sources of heat including fire. Dimethyl phosphorochloridothioate will liberate toxic phosphorus and sulfur oxides when heated to decomposition.*

Other Names - Chlorodimethoxyphosphine sulfide, dimethoxy thiophosphonyl chloride, dimethyl chlorothiophosphate, Methyl PCT.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Dimethyl Phosphorochloridothioate (Methyl PCT) Exposure:

Warning: *Methyl PCT is extremely corrosive. Caution is advised.*

Note: Methyl PCT is a cholinesterase inhibitor.

Acute exposure to Methyl PCT may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

DIMETHYL PHOSPHOROCHLORIDOTHIOATE (METHYL PCT)

The heart rate may either decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) may occur, although hypertension (high blood pressure) is not uncommon. Chest pain may be noted. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur. Contact with the skin, eyes, or mucous membranes may result in severe irritation, burns, and pain.

Emergency Life-Support Procedures:

Acute exposure to Methyl PCT may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to Methyl PCT.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to Methyl PCT.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

DIMETHYL PHOSPHOROCHLORIDOTHIOATE (METHYL PCT)

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FORMOTHION

CAS Registry Number: 2540-82-1

Synonyms: Aflix; Anthio; Anthio 25; Antio; CP 53926; ENT 27,257; Formithion; J-38; N-Formyl-N-Methylcarbamoylmethyl O,O-Dimethyl Phosphorodi- thioate; O,O-Dimethyl Dithiophosphorylacetic Acid N-Methyl-N-Formylamide; O,O-Dimethyl Phosphorodithioate N-Formyl-2-Mercapto-N-Methylacetamide S-Ester; O,O-Dimethyl S-(N-Formyl-N-Methylcarbamoylmethyl) Phosphorodithioate; O,O-Dimethyl S-(N-Methyl-N-Formylcarbamoylmethyl) Phosphorodithioate; OMS-968; P 1; Phosphorodithioic Acid, O,O-Dimethyl Ester, N-Formyl-2-Mercapto-N-Methyl-acetamide S-Ester; Phosphorodithioic Acid, O,O-Dimethyl Ester, S-Ester with N-Formyl-2-Mercapto-N-Methylacetamide; Phosphorodithioic Acid, S-(2-(Formylmethylamino)-2-Oxoethyl) O,O-Dimethyl Ester; S 6900; S-(2-(Formylmethylamino)-2-Oxoethyl) O,O-Dimethyl Phosphorodithioate; S-(N-Formyl-N-Methylcarbamoylmethyl) Dimethyl Phosphorothiolothionate; S-(N-Formyl-N-Methylcarbamoylmethyl) O,O-Dimethyl Phosphorodithioate; SAN 244 I; SAN 6913 I; SAN 7107 I; Toprose; VEL 4284

Chemical Formula: $C_6H_{12}NO_4PS_2$

Molecular Weight: 257.29

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.027 mg/liter (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.361 at 20°C (*Spencer 1973)

Vapor Pressure (mmHg): 0.0000085 at 20°C (*Spencer 1973)

FORMOTHION

SECTION II (continued)

Melting Point: 77°F, 25°C (*Spencer 1973)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (*Merck 1976)

Appearance and Odor: Viscous yellow oil or crystalline mass (*Spencer 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 1157)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Formothion is one of the least toxic systemic organophosphates (*Agrochem Dept. of Info. Service 1971). Formothion is a compound of low to moderate toxicity (Hayes 1982, p. 369). It causes the depression of cholinesterase (Hayes 1982, p. 370) leading to accumulation of acetylcholine in the nervous system, which is believed to be responsible for the symptoms (Doull 1980, p. 367).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is an organophosphorus insecticide (Buchel 1983, p. 71). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is an organophosphorus insecticide (Buchel 1983, p. 71). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate

FORMOTHION

SECTION IV (continued)

closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides, phosphorus oxides and sulfur oxides (Sax 1984, p. 1157). This compound is an organophosphorus insecticide (Buchel 1983, p. 71). Some of these materials may burn but none of them ignite readily. Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Martin 1974)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Alkaline pesticides; hydrolyzed by water especially under alkaline conditions (Farm Chemicals Handbook 1984, p. C106))

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

An insecticide and acaricide on crops and ornamentals. It is not presently produced commercially in the U.S. (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This compound is an organophosphorus insecticide (Buchel 1983, p. 71). Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

FORMOTHION

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Early symptoms of poisoning include: headache, dizziness, weakness, perspiring, nausea, vomiting, and sensation of tightness in chest (*Agrochem Dept. of Info. Service 1971). Chronic low doses may produce symptoms similar to influenza. Acute exposure causes psychotic behavior, uncoordination, unconsciousness, convulsions, abdominal pain, diarrhea, labored breathing, blurred vision, and profound weakness (*Rumack 1975 to Present).

Emergency and First Aid Procedures: This compound is an organophosphorus insecticide (Buchel 1983, p. 71). Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PENTADECYLAMINE

CAS Registry Number: 2570-26-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 12) 1-Pentadecanamine; n-Pentadecylamine; 1-Pentadecylamine

Chemical Formula: $C_{15}H_{33}N$

Molecular Weight: 227.49

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mammal) 0.2 mg/liter (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 585.7°F, 307.6°C (Weast 1983, p. C-414)

Specific Gravity (H_2O=1): 0.8104 at 20°C/4°C (Weast 1983, p. C-414)

Vapor Pressure (mmHg): Not Found

Melting Point: 99.1°F, 37.3°C (Weast 1983, p. C-414)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Flakes (Weast 1983, p. C-414)

PENTADECYLAMINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2128)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2128)

Health Hazards (Acute, Delayed, and Chronic): This material is moderately toxic by oral ingestion and highly toxic by inhalation (Sax 1984, p. 2128).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Alkylamine, n.o.s.) Flammable/combustible material; may be ignited by heat, sparks, or flames. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 29).

Special Fire Fighting Procedures: (Non-Specific -- Alkylamine, n.o.s.) Move container from fire area if you can do it without risk. Do not get water inside container. Cool containers that are exposed to flames with water from the side until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 29).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 2128). (Non-Specific -- Alkylamine, n.o.s.) 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 (DOT 1984, Guide 29).

NFPA Flammability Rating: Not Found

PENTADECYLAMINE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of oxides of nitrogen (Sax 1984, p. 2128).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Alkylamine, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors; do not get water inside container. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 29).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Nitrile	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

PENTADECYLAMINE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Alkylamine, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 29).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: June 22, 1987
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHOROTHIOIC ACID, O,O-DIMETHYL S-(2-(METHYLTHIO) ETHYL) ESTER

CAS Registry Number: 2587-90-8

Synonyms: Cebetox; Cymetox; Demephion; Demephion-S; Ethanethiol, 2-(Methylthio)-, O,O-Dimethyl Phosphorothioate; Ethanethiol, 2-(Methylthio)-, S-Ester with O,O-Dimethyl Phosphorothioate; Isonitox; Methyl Demeton Methyl; 2-Methylthioethyl O,O-Dimethyl Phosphorothioate; Tinox

Chemical Formula: $C_5H_{13}O_3PS_2$

Molecular Weight: 216.27

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 20 mg/kg (*NIOSH/RTECS 1987)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 149°F, 65°C at 0.1 mmHg (decomposes) (Worthing 1979, p. 153)

Specific Gravity (H_2O=1): 1.218 at 25°C/4°C (Worthing 1979, p. 153)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 300 mg/liter (*Worthing 1979, p. 153)

Appearance and Odor: Straw-colored liquid (Worthing 1979, p. 153)

PHOSPHOROTHIOIC ACID, O,O-DIMETHYL S-(2-(METHYLTHIO) ETHYL) ES

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** (Non-specific -- Organophosphorus pesticide, liquid) Yes (DOT 1984, Guide 55).
Skin: (Non-specific -- Organophosphorus pesticide, liquid) Yes (DOT 1984, Guide 55).
Ingestion: (Non-specific -- Organophosphorus pesticide, liquid) Yes (DOT 1984, Guide 55).

Health Hazards (Acute, Delayed, and Chronic): (Non-specific -- Organophosphorus pesticide, liquid) May be fatal if inhaled, swallowed or absorbed through the skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 55). (Non-specific -- Organophosphate insecticide) May cause respiratory failure (Casarett and Doull 1980, p. 367).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found

Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus pesticide, liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus pesticide, liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus pesticide, liquid, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire. Fire may produce irritating or poisonous gases. Runoff from fire control water may give

PHOSPHOROTHIOIC ACID, O,O-DIMETHYL S-(2-(METHYLTHIO) ETHYL) ESTER

SECTION IV (continued)

off poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This chemical is a systemic insecticide and acaricide effective against sucking insects (Worthing 1979, p. 153).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus pesticide, liquid) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-specific -- Organophosphorus insecticide) Exposure may cause tightness of chest, wheezing, increased

PHOSPHOROTHIOIC ACID, O,O-DIMETHYL S-(2-(METHYLTHIO) ETHYL) ESTEI

SECTION IX (continued)

salivation and lacrimation, increased sweating, nausea, abdominal cramps, diarrhea, involuntary defecation, decreased heart action that can lead to heart block, frequent and involuntary urination, constriction of the pupils (miosis), easy fatigue, mild weakness, pallor, elevated blood pressure, hyperglycemia (Casarett and Doull 1980, p. 367).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus pesticide, liquid) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Merck 1983
Sax 1984
Hayes 1982
Verschueren 1983
Clayton and Clayton 1981-1982
Weiss 1980
Goodman and Gilman 1985
Weast 1986-1987
Gosselin 1984
Hawley 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PROMECARB

CAS Registry Number: 2631-37-0

Synonyms: Carbamic Acid, Methyl-, m-Cym-5-yl Ester; 3-Isopropyl-5-Methylphenyl Methylcarbamate; 3-Methyl-5-(1-Methylethyl)Phenyl Methylcarbamate; 3-Methyl-5-Isopropylphenyl-N-Methylcarbamate; 5-Isopropyl-m-Tolyl Methylcarbamate; Carbamic Acid, (3-Methyl-5-(1-Methylethyl)Phenyl)-, Methyl Ester; Carbamic Acid, N-Methyl-, 3-Methyl-5-Isopropylphenyl Ester; Carbamult; Carbanilic Acid, 3-Isopropyl-5-Methyl-, Methyl Ester; ENT 27300; ENT 27300-A; EP 316; m-Cym-5-yl Methylcarbamate; OMS 716; Promecarbe; SCH 34615; Schering 34615; Phenol, 3-Methyl-5-(1-Methylethyl)-,Methylcarbamate

Chemical Formula: $C_{12}H_{17}NO_2$

Molecular Weight: 207.28

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 16mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 243°F, 117°C at 0.01 mmHg (*Merck 1976)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.00003 at 25°C (Worthing 1983)

Melting Point: 189-190°F, 87-87.5°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

PROMECARB

SECTION II (continued)

Solubility in Water: 92 mg/liter at room temperature (*Martin and Worthing 1974)

Appearance and Odor: Almost odorless, colorless crystalline solid (*Martin and Worthing 1974).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Doull 1980, p. 375)
Skin: Yes (Doull 1980, p. 375)
Ingestion: Yes (Doull 1980, p. 375)

Health Hazards (Acute, Delayed, and Chronic): Promecarb is highly toxic by ingestion and is absorbed through the intact skin. It is a reversible cholinesterase inhibitor and its effects are related to action on the nervous sysem (Gosselin 1984, p. II-308; *Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamates) Extinguish fire using agent suitable for the surrounding fire, as the material itself burns with difficulty. Use water in flooding quantities as a fog. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 104).

(Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Stay upwind; keep out of low areas. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

PROMECARB

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, no changes observed on storage for 140 hours at 50°C (122F) (*Martin and Worthing 1974).

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Hydrolyzed by alkalis (*Merck 1976).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Non-systemic contact insecticide (*Martin and Worthing 1974). Not for sale or use in the USA (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard areas and deny entry. Stay upwind and keep out of low areas. Do not touch spilled material or breathe the dusts, vapors, or fumes from burning materials. Use water spray to reduce vapors. Do not handle broken packages without protective equipment. Wash away any material that may have contacted the body with soap and water. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. Small dry spills: with clean shovel place material into clean, dry container and cover; move containers from spill area. Dike far ahead of large spills for later disposal (Student 1981, p. 104; DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

PROMECARB

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Diarrhea, nausea, vomiting, excessive salivation, headache, pinpoint pupils and uncoordinated muscle movements are all common symptoms of exposure to carbamate insecticides (*Rumack 1975 to Present).

Emergency and First Aid Procedures: Move the victim to fresh air and monitor for respiratory distress. If a cough or difficulty in breathing develops, be sure airways are clear and be prepared to provide oxygen. Decontaminate the patient if there is any possibility of exposure to the skin. Wash the skin and hair with soap and water at least twice. Remove all contaminated clothing (*Rumack 1975 to Present; DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CYANOPHOS

CAS Registry Number: 2636-26-2

Synonyms: (NIOSH/RTECS Synonyms, Volume 3, p. 154) Phosphorothioic Acid, O,O-Dimethyl Ester, O-Ester with p-Hydroxybenzonitrile; BAY 34727; Bayer 34727; Ciafos; O-p-Cyanophenyl O,O-Dimethyl Phosphorothioate; Cyanox; Cyap; O,O-Dimethyl-O-p-Cyanophenyl Phosphorothioate; O,O-Dimethyl O-4-Cyanophenyl Phosphorothioate; O,O-Dimethyl O-4-Cyanophenyl Thiophosphate; ENT 25,675; Phosphorothioic Acid O-(4-Cyanophenyl) O,O-Dimethyl Ester; S 4084; Sumitomo S 4084; Sunitomo S 4084

Chemical Formula: $C_9H_{10}NO_3PS$

Molecular Weight: 243.23

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 18 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 246-248°F, 119-120°C at 0.09 mmHg (Decomposes) (Merck 1983, p. 322)

Specific Gravity (H_2O=1): 1.255-1.265 at 25°C/4°C (Worthing 1983, p. 142)

Vapor Pressure (mmHg): 0.0008 at 20°C (Worthing 1983, p. 142)

Melting Point: 57-59°F, 14-15°C (Merck 1983, p. 322)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

CYANOPHOS

SECTION II (continued)

Solubility in Water: Slightly soluble (Merck 1983, p. 322)

Appearance and Odor: Yellow to reddish-yellow transparent liquid (Merck 1983, p. 322).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hayes, 1982, p. 301)
Skin: Yes (Hayes, 1981, p. 301)
Ingestion: Yes (Hayes, 1982, p. 301)

Health Hazards (Acute, Delayed, and Chronic): Cyanophos is an organophosphorus insecticide (Buchel 1983, p. 80). It is a cholinesterase inhibitor (Merck 1983, p. 322). Death may occur after a massive oral dose; with smaller accidental doses, onset of illness may be delayed (Hayes 1982, p. 302).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

CYANOPHOS

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (Merck 1983, p. 322)
Stable:

Conditions to Avoid: Rapidly decomposes under alkaline conditions and upon exposure to light (Merck 1983, p. 322).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is an insecticide (Merck 1983, p. 322) used against rice stem borers and house flies (Buchel 1983, p. 80). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. Dike far ahead of large spills for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CYANOPHOS

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms of organophosphorus pesticide poisoning include: headache, giddiness, nervousness, blurred vision, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include: sweating, pinpoint pupils, tearing, salivation and other excessive respiratory tract secretion, vomiting, cyanosis, papilledema, uncontrollable muscle twitches followed by muscular weakness, convulsions, coma, loss of reflexes, and loss of sphincter control (Hayes 1982, p. 301).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Farm Chemicals Handbook 1984
Sax 1984
Weast 1979
Hawley 1981
Gosselin 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- AZINPHOS-ETHYL

CAS Registry Number: 2642-71-9

Synonyms: Phosphorodithioic Acid, O,O-Diethyl Ester, S-Ester with 3-(Mercaptomethyl)-1,2,3-Benzotriazin-4(3H)-one; Ethyl Guthion; 3,4-Dihydro-4-oxo-3-Benzotriazinylmethyl O,O-Diethyl Phosphorodithioate; Athyl-Gusathion; BAY 16259; Bayer 16259; Cotnion-Ethyl; Crysthion; ENT 22,014; Ethyl Azinphos; Ethyl Gusathion; Ethyl Homolog of Guthion; Gusathion A; Gusathion H and K; Gusation A; Guthion (Ethyl); O,O-Diethyl S-(4-Oxobenzyltriazine-3-Methyl) Dithiophosphate; O,O-Diethyl S-(4-Oxobenzotriazino-3-Methyl) Phosphorodithioate; Phosphorodithioic Acid, O,O-Diethyl Ester, S-Ester With 3-(Mercaptomethyl)-1,2,3-Benzotriazin-4(3H)-one; Phosphorodithioic Acid, O,O-Diethyl S-((4-oxo-1,2,3-Benzotriazin-3(4H)-yl)Methyl) Ester; R 1513; S-(3,4-Dihydro-4-oxo-1,2,3-Benzotriazin-3-yl Methyl) O,O-Diethyl Phosphorodithioate; Azinphos Ethyl Dithiophosphate

Chemical Formula: $C_{12}H_{16}N_3O_3PS_2$

Molecular Weight: 345.38

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 232°F, 111°C at 0.001 mmHg (*Worthing 1979)

Specific Gravity (H_2O=1): 1.284 at 20°C/4°C (*Worthing 1979)

Vapor Pressure (mmHg): 0.00000022 at 20°C (*Worthing 1979)

Melting Point: 127°F, 53°C (*Farm Chemicals Handbook 1981)

AZINPHOS-ETHYL

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Farm Chemicals Handbook 1981)

Appearance and Odor: Colorless crystals (*Farm Chemicals Handbook 1981)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): The systemic effects of this compound are similar to parathion. It is an extremely potent systemic toxicant via ingestion, inhalation and skin contact. It may cause death or permanent injury after very short exposure to small quantities (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) When heated to decomposition, it emits very toxic fumes of sulfur, phosphorus and nitrogen oxides (Sax 1984, p. 1355). Container

AZINPHOS-ETHYL

SECTION IV (continued)

may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of nitrogen, phosphorous and sulfur oxides (Sax 1984, p. 1355).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is a non-systemic insecticide with good ovicidal properties and long persistence. It is not registered for use in the U.S. (*SRI). Among other crops, it is used on cotton, citrus, vegetables, potatoes, tobacco, rice, and cereals (*Worthing 1979) to control caterpillars, beetles, aphids, spiders and many other insects (*Farm Chemicals Handbook 1981).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

AZINPHOS-ETHYL

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: The symptoms are similar to parathion. Nausea is often the first symptom followed by vomiting, abdominal cramps, diarrhea and excessive salivation. Also common in inhalation exposure are headache, giddiness, vertigo and weakness, nasal discharge and a sensation of tightness in the chest. Other symptoms include blurring or dimness of vision; tearing; eye muscle spasm and pain; pinpoint pupils; loss of muscle coordination; slurring of speech; muscle twitching (especially tongue and eyelids); difficulty in breathing; excessive secretions of mucous in mouth, nose, and respiratory tract; convulsions and coma (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticides, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHONOTHIOIC ACID, METHYL-, O-(4-NITROPHENYL) O-PHENYL ESTER

CAS Registry Number: 2665-30-7

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 124) CP 40294; ENT 25,787; Monsanto CP-40294; Phosphonothioic Acid, Methyl-, O-(p-Nitrophenyl) O-Phenyl Ester

Chemical Formula: $C_{13}H_{12}NO_4PS$

Molecular Weight: 309.29

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

PHOSPHONOTHIOIC ACID, METHYL-, O-(4-NITROPHENYL) O-PHENYL ESTI

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organic Phosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organic Phosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (Non-Specific -- Organic Phosphorus Pesticide) (Hayes 1982, p. 301)

SECTION V -- HEALTH HAZARD DATA (Continued)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Organic Phosphorus Insecticides) Organic phosphorus insecticides are absorbed by the skin, as well as by the respiratory and gastrointestinal tracts. It is a cholinesterase inhibitor (Hayes 1982, p. 301).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide) Stay upwind; keep out of low areas. Move containers from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide) Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found

PHOSPHONOTHIOIC ACID, METHYL-, O-(4-NITROPHENYL) O-PHENYL ESTER

SECTION V (continued)

Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organic Phosphorus Insecticides) Do not touch spilled material; stop leak if possible. Use water spray to reduce vapors. Absorb spills with noncombustible absorbent material. For large spills dike far ahead for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Organic Phosphorus Insecticides) Symptoms are headache, giddiness, blurred vision, nervousness, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include sweating, tearing, salivation, vomiting, bluing of the skin, convulsions, coma, loss of reflexes and loss of sphincter control (Hayes 1982, p. 302).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide) Move victim to fresh air; 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

PHOSPHONOTHIOIC ACID, METHYL-, O-(4-NITROPHENYL) O-PHENYL ESTE

SECTION IX (continued)

temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 55).

COMMENTS

Sources searched, no information found:

Sax 1984
Merck 1983
Farm Chemicals Handbook 1984
Buchel 1983
Verschueren 1983
Weast 1979
Hawley 1981

Chemical structure indicates that this is an organic phosphorus pesticide.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHONOTHIOIC ACID, METHYL-, O-ETHYL O-(4-(METHYLTHIO)PHENYL) ESTER

CAS Registry Number: 2703-13-1

Synonyms: (SANSS 1983 Synonyms) Bayer 29952; BAY 29952; ENT 25,612; O-Ethyl O-[4-(Methylthio)Phenyl] Methylphosphonothioate; Phenol, p-(Methylthio)-O-Ester with O-Ethyl Methylphosphonothioate; Phosphonothioic Acid, Methyl-, O-Ethyl O-(p-(Methylthio)Phenyl) Ester

Chemical Formula: $C_{10}H_{15}O_2PS_2$

Molecular Weight: 262

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 1 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

PHOSPHONOTHIOIC ACID, METHYL-, O-ETHYL O-(4-(METHYLTHIO)PHENY
ESTER

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PHOSPHONOTHIOIC ACID, METHYL-, O-ETHYL O-(4-(METHYLTHIO)PHENYL) ESTER

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

RTECS 1983
ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Physicians' Desk Reference 1985
Gilman 1985
DOT 1984
Hayes 1982

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THALLOUS MALONATE

CAS Registry Number: 2757-18-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p.637) Malonic Acid, Thallium Salt (1:2); Formomalenic Thallium; Propanedioic Acid, Dithallium Salt; Thallium Malonate

Chemical Formula: $C_3H_2O_4 \cdot 2Tl$

Molecular Weight: 510.79

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 18.8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Thallium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

THALLOUS MALONATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Soluble Thallium Compounds) 0.1 mg/m^3, as thallium (OSHA 1984, p. 663)

ACGIH TLV: (Soluble Thallium Compounds) 0.1 mg/m^3, as thallium (skin) (ACGIH 1985, p. 31)

IDLH: Not Found

Other Limits Recommended: (IDLH for soluble thallium compounds) 20 mg/m^3 (NIOSH 1987, p. 224)

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Thallium Salts, n.o.s.) (DOT 1984, Guide 53)
Skin: Not Found
Ingestion: Yes (Non-Specific -- Thallium Salts, n.o.s.) (Gosselin 1984, p. III-379)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Thallium Salts, n.o.s.) Poisonous if swallowed. Inhalation of dust causes poisoning (DOT 1984, Guide 53).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Thallium Salts, n.o.s.) For small fires use dry chemical, carbon dioxide, water spray, or foam. For large fires use water spray, fog, or foam. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Thallium Salts, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: (Non-Specific -- Thallium Salts, n.o.s.) Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

THALLOUS MALONATE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above).
(Non-Specific -- Thallium Salts, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Thallium Salts, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

THALLOUS MALONATE

COMMENTS

Sources searched but no information found:

ACGIH 1983
Hawley 1981
Weast 1979
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MUSCIMOL

CAS Registry Number: 2763-96-4

Synonyms: 3-Isoxazolol, 5-(Aminomethyl)-; 3(2H)-Isoxazolone, 5-(Aminomethyl)-; 3-Hydroxy-5-Aminomethylisoxazole; 3-Hydroxy-5-Aminomethylisoxazole-Agarin; 5-(Aminomethyl)-3-Isoxazolol; 5-Aminomethyl-3-Hydroxyisoxazole; 5-Aminomethyl-3-Isoxyzole; Agarin; Agarine; Pantherine

Chemical Formula: $C_4H_6N_2O_2$

Molecular Weight: 114.12

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 17 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10,000 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 347°F, 175°C (decomposes) (Merck 1983, p. 903)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (Gosselin 1984, p. II-247)

Appearance and Odor: Crystals (*Merck 1976)

MUSCIMOL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 227)

Health Hazards (Acute, Delayed, and Chronic): This compound is a natural constituent of amanita mushrooms and is extremely toxic. It is a potent central nervous system depressant, and is believed to be responsible for most of the nervous system effects that result from eating this mushroom (*Grant 1974; *Gilman 1980). The lowest toxic dose in humans has been reported at 109 mg/kg (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 227).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits toxic fumes of nitrogen oxides (Sax 1984, p. 227).

MUSCIMOL

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Formerly used as a sedative and an antiemetic (*Merck 1976) and for experimental laboratory purposes (*Peer Review Committee).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Muscimol is a potent central nervous system depressant (*Merck 1976). Initially, drowsiness, stupor, or sleep followed by mild nausea and vomiting, muscle spasms in extremities, various emotional changes and distorted perceptions of space and time, but only rarely hallucinations (Gosselin 1984, p. II-247).

Emergency and First Aid Procedures: Treat as for general poisoning (*Rumack 1975 to Present). 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. Speed in removing material from skin is of extreme importance. Remove and isolate contaminated clothing and shoes at the site (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ENDOTHION

CAS Registry Number: 2778-04-3

Synonyms: Phosphorothioic Acid, O,O-Dimethyl Ester, S-Ester with 2-(Mercaptomethyl)-5-Methoxy-4H-Pyran-4-one; 2-(S-Dimethylphosphorothiomethyl)-5-Methoxy-4-Pyrone; 5-Methoxy-2-(Dimethoxyphosphinylthiomethyl) Pyrone-4; AC-18737; Endocid; Endocide; ENT 24653; Exothion; FMC 5767; NIA 5767; Niagara 5767; O,O-Dimethyl Phosphorothioate, S-Ester with 2-(Mercaptomethyl)-5-Methoxy-4H-Pyran-4-one; O,O-Dimethyl S-(5-Methoxy-4-oxo-4H-Pyran-2-yl) Phosphorothioate; O,O-Dimethyl S-(5-Methoxypyronyl-2-Methyl) Thiophosphate; Phosphate 100; Phosphopyron; Phosphopyrone; Phosphorothioic Acid, S-((5-Methoxy-4-oxo-4H-Pyran-2-yl)Methyl) O,O-Dimethyl Ester; S-(5-Methoxy-4-Pyron-2-ylmethyl) Dimethyl Phosphorothioate; S-5-Methoxy-4-Oxopyran-2-ylmethyl Dimethyl Phosphorothioate; S-5-Methoxy-4-Pyron-2-ylmethyl O,O-Dimethyl Phosphorothioate; S-[(5-Methoxy-4-Oxo-4H-Pyran-2-yl)Methyl] O,O-Dimethyl Phosphorothioate

Chemical Formula: $C_9H_{13}O_6PS$

Molecular Weight: 280.24

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 17 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

ENDOTHION

SECTION II (continued)

Melting Point: 205°F, 96°C (*Martin and Worthing 1974); 194-196°F, 90-91°C (Hawley 1981, p. 410)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 150 g/100 ml at 68°F, 20°C (*Martin and Worthing 1974)

Appearance and Odor: White crystals, slight odor (*Martin and Worthing 1974).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 1276)
Ingestion: Yes (Sax 1984, p. 1276)

Health Hazards (Acute, Delayed, and Chronic): This material is poisonous to humans (Hayes 1982, p. 365). Its toxic effects are most likely related to action on the nervous system (Clayton and Clayton 1982, p. II-291).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

ENDOTHION

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Cylinder may explode in heat or fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of phosphorous oxides and sulfur oxides (Sax 1984, p. 1276).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is a systemic insecticide (*Martin and Worthing 1974). It is not sold in the USA or Canada (Hayes 1982, p. 365).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

ENDOTHION

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include headache, dizziness, nausea, salivation, vomiting, abdominal pain, diarrhea, chest pain, blurred vision, muscle twitching, and weakness. Exposure may cause psychotic behavior, loss of coordination, unconsciousness, and rarely, convulsions (*Rumack 1975 to Present).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SILANE, (4-AMINOBUTYL)DIETHOXYMETHYL-

CAS Registry Number: 3037-72-7

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 775): Butylamine, 4-(Diethoxymethylsilyl)-; (4-Aminobutyl)diethoxymethylsilane; delta-Aminobutylmethyldiethoxysilane

Chemical Formula: $C_9H_{23}NO_2Si$

Molecular Weight: 205.42

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} dermal (rat, mouse, rabbit) 45 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

SILANE, (4-AMINOBUTYL)DIETHOXYMETHYL-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 204)
Ingestion: Yes (Sax 1984, p. 204)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic to skin, moderately toxic by ingestion and is a mild skin irritant (Sax 1984, p. 204).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 204).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 204).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

SILANE, (4-AMINOBUTYL)DIETHOXYMETHYL-

SECTION V (continued)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid contact with skin (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Arena 1978
Doull 1980
Encyc Occupat Health and Safety 1983
NFPA 1984
Gilman 1985
Gosselin 1983
Hawley 1981
Hayes 1982
Merck 1983
Weiss 1980
Farm Chemicals Handbook 1984
NIOSH/OSHA 1978
ACGIH 1983
Weast 1979
Verschueren 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHORIC ACID, DIMETHYL 4-(METHYLTHIO) PHENYL ESTER

CAS Registry Number: 3254-63-5

Synonyms: Dimethyl p-(Methylthio)Phenyl Phosphate; 4-Methylthiophenyl Dimethyl Phosphate; Allied GC 6506; ENT 25734; GC 6506; HA-1200; O,O-Dimethyl O-(4-Methylmercaptophenyl) Phosphate; Phenol, p-(Methylthio)-, Dimethyl Phosphate; Phosphoric Acid, Dimethyl p-(Methylthio)Phenyl Ester

Chemical Formula: $C_9H_{13}O_4PS$

Molecular Weight: 248.25

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.273 at 21.4°C (*Worthing 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 9.8 mg/100 ml at room temperature (*Worthing 1979)

Appearance and Odor: Colorless liquid (*Worthing 1979)

PHOSPHORIC ACID, DIMETHYL 4-(METHYLTHIO) PHENYL ESTER

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2214)
Skin: Yes (Sax 1984, p. 2214)
Ingestion: Yes (Sax 1984, p. 2214)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic by oral or skin exposure (Sax 1984, p. 2214). Its effects are probably due to action on the nervous system (Doull 1980, p. 371). This compound may cause death through respiratory arrest (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) May burn but does not ignite readily (DOT 1984, Guide 55)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk. Fight fire from maximum distance (DOT 1984 Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Wear positive pressure breathing apparatus and special protective clothing. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of sulfur oxides and phosphorus oxides (Sax 1984, p. 2214). (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

PHOSPHORIC ACID, DIMETHYL 4-(METHYLTHIO) PHENYL ESTER

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Hydrolyzed by alkalies at 37.5°C (*Worthing 1979).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of sulfur oxides and phosphorus oxides (Sax 1984, p. 2214).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

A contact and systemic insecticide and acaricide (*Worthing 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticides) Keep material out of water courses and sewer. Build dikes to contain flow as necessary. Use water spray to knock down vapor. Do not touch spilled material (Student 1981, p. 384). (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms are similar to those of parathion. Common symptoms upon inhalation include: nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headaches, dizziness, weakness, runny nose, and sensation of tightness in chest. Other symptoms include: loss of muscle coordination, slurring of speech, mental

PHOSPHORIC ACID, DIMETHYL 4-(METHYLTHIO) PHENYL ESTER

SECTION IX (continued)

confusion, and disorientation. Further exposure symptoms include convulsions, loss of bladder control, random jerky movements, and coma (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. 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. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SULFOXIDE, 3-CHLOROPROPYL OCTYL

CAS Registry Number: 3569-57-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 672) Sulfoxide, 3-Chloropropyl-n-Octyl-; 3-Chloropropyl-n-Octylsulfoxide, MGK Repellent 1,207

Chemical Formula: $C_{11}H_{23}ClOS$

Molecular Weight: 238.85

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} dermal (rabbit) 8 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

SULFOXIDE, 3-CHLOROPROPYL OCTYL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SULFOXIDE, 3-CHLOROPROPYL OCTYL

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENT

The following sources were searched but no information was found:

Clayton and Clayton 1981-82
Merck 1983
Sax 1984
Verschueren 1983
Weast 1979
Hayes 1981
Buchel 1983
Farm Chemicals Handbook 1984
DOT 1984

EPA CHEMICAL PROFILE

Date: June 22, 1987
Revision: November 30, 1987

CHEMICAL IDENTITY -- BENZIMIDAZOLE, 4,5-DICHLORO-2-(TRIFLUOROMETHYL)-

CAS Registry Number: 3615-21-2

Synonyms: Chlorflurazole; Chloroflurazole;
4,5-Dichloro-2-Trifluoromethylbenzimidazole;
1H-Benzimidazole, 4,5-dichloro-2-(Trifluoromethyl)-; NC 3363;
4,5-Dichloro-2-(Trifluoromethyl)-1H-Benzimidazole;
4,5-Dichloro-2-(Trifluoromethyl)benzimidazole

Chemical Formula: $C_8H_3Cl_2F_3N_2$

Molecular Weight: 255.03

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 13.08 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.00004 mmHg (5.3 mPa) at 22.5°C (*Spencer 1982)

Melting Point: 415-417°F, 213-214°C (*Spencer 1982)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 69 ppm @ 25°C (*Spencer 1982)

BENZIMIDAZOLE, 4,5-DICHLORO-2-(TRIFLUOROMETHYL)-

SECTION II (continued)

Appearance and Odor: Crystalline solid, fine white needles when pure; brownish commercial material (*Spencer 1982)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** (Non-Specific -- Pesticide, solid, n.o.s.) Yes (DOT 1984, Guide 53)
Skin: Not Found
Ingestion: (Non-Specific -- Pesticide, solid, n.o.s.) Yes (DOT 1984, Guide 53)

Health Hazards (Acute, Delayed, and Chronic): (Non-specific -- Pesticide, solid, n.o.s.) Poisonous if swallowed. Inhalation of dust poisonous (DOT 1984, Guide 53).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): (Non-Specific -- Pesticide, solid, n.o.s.) May burn, but does not ignite readily (DOT 1984, Guide 53).
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Pesticide, solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Pesticide, solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: (Non-Specific -- Pesticide, solid, n.o.s.) Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

BENZIMIDAZOLE, 4,5-DICHLORO-2-(TRIFLUOROMETHYL)-

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Spencer 1982)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Amine salts of hormone herbicides, alkali-unstable fungicides or insecticides (*Spencer 1982)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an herbicide (*Farm Chemicals Handbook 1984).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Pesticide, solid, n.o.s.) Do not touch 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Pesticide, solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SULFOTEP

CAS Registry Number: 3689-24-5

Synonyms: Thiopyrophosphoric Acid, Tetraethyl Ester; Dithion; Di(thiophosphoric)Acid, Tetraethyl Ester; Dithio; Dithiodiphosphoric Acid, Tetraethyl Ester; Dithiofos; Dithione; Dithiophos; ASP 47; Bay-E-393; Bis-O,O-Diethylphosphorothionic Anhydride; Bladafum; Pirofos; Plant Dithio Aerosol; Plantfume 103 Smoke Generator; Pyrophosphoric Acid, Dithiono-, Tetraethyl Ester; Pyrophosphorodithioic Acid, O,O,O,O-Tetraethyl Ester; Pyrophosphorodithioic Acid, Tetraethyl Ester; Sulfatep; Sulfotepp; Sulphatep; TEDP; TEDTP; Tetraethyl Dithio Pyrophosphate, Liquid (DOT); Tetraethyl Dithionopyrophosphate; Tetraethyl Dithiopyrophosphate; Tetraethyl Thiodiphosphate; Tetraethyl Thiopyrophosphate; Thiodiphosphoric Acid [((HO)2P(S))2O], Tetraethyl Ester; Thiopyrophosphoric Acid [((HO)2PS)2O], Tetraethyl Ester; Thiopyrophosphoric Acid, Tetraethyl Ester; Thiotep; Thiotepp

Chemical Formula: $C_8H_{20}O_5P_2S_2$

Molecular Weight: 322.32

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.038 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 277-282°F, 136-139°C at 2 mmHg (*Weast 1979)

Specific Gravity (H_2O=1): 1.196 at 25°C (*Weast 1974)

Vapor Pressure (mmHg): 0.00017 at 20°C (*Worthing 1979)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

SULFOTEP

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 25 mg/liter at room temperature (Worthing 1983)

Appearance and Odor: Colorless oil (*Weast 1979); pale yellow mobile liquid (*Worthing 1979); garlic odor (*ACGIH 1980)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.2 mg/m^3 (skin) (*NIOSH/OSHA 1978)

ACGIH TLV: TWA 0.2 mg/m^3 (skin) (ACGIH 1986-87, p. 30)

IDLH: 35 mg/m^3 (*NIOSH/OSHA 1978)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 981)
Skin: Yes (Sax 1984, p. 1395)
Ingestion: Yes (Sax 1984, p. 1395)

Health Hazards (Acute, Delayed, and Chronic): Super toxic; probable oral lethal dose in humans is less than 5 mg/kg, or a taste (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976). It is a cholinesterase inhibitor (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not combustible (NIOSH/OSHA 1978, p. 172)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam. Fight fire from maximum distance (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, emits highly toxic fumes of phosphorus oxides and sulfur oxides (*Sax 1979).

NFPA Flammability Rating: Not Found

SULFOTEP

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Spencer 1973)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1978, p. 172). Technical products corrosive to iron (*Worthing 1979).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide; acaricide (*Farm Chemicals Handbook 1981); mitocide (Merck 1983, p. 1287).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphate Pesticide) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Material is similar to parathion in symptomatology, including nausea followed by vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, dizziness, weakness,

SULFOTEP

SECTION IX (continued)

tightness in chest, blurring of vision, tearing, slurring of speech, confusion, difficulty breathing, convulsions, coma and even death (*Gosselin 1976).

Emergency and First Aid Procedures: Emergency treatment is similar to that for parathion poisoning (*Rumack 1975 to Present) and includes: moving victim to fresh air and calling 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLOROPHACINONE

CAS Registry Number: 3691-35-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, pp. 514-515) 1,3-Indandione, 2-((p-Chlorophenyl)Phenylacetyl-; 2-[(4-Chlorophenyl) Phenylacetyl]-1H-indene-1,3(2H)-dione; 2-[(p-chlorophenyl)phenyl- acetyl]-1,3-indandione; LM91; CAID; Drat; Liphadione; Quick; Raviac; Rozol; Delta; Microzul; Muriol; 2-(2-Phenyl-2-(4-chlorophenyl)acetyl)-1,3-Indandione; Ramucide; Ranac; Ratomet; Topitox; 1H-Indene-1,3(2H)-Dione, 2-[(4-Chlorophenyl)Phenylacetyl]-; Afnor; 2-(alpha-p-Chlorophenylacetyl)Indane-1,3-Dione; 2(2-(4-Chlorophenyl)-2-Phenylacetyl)Indan-1,3-Dione

Chemical Formula: $C_{23}H_{15}ClO_3$

Molecular Weight: 374.82

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 1.06 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 284°F, 140°C (Merck 1983, p. 302)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

CHLOROPHACINONE

SECTION II (continued)

Solubility in Water: Very sparingly soluble (Merck 1983, p. 302)

Appearance and Odor: Crystals (Merck 1983, p. 302). Commercially available as oil concentrate and as dust concentrate (Gosselin 1984, p. II-348).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 749)
Ingestion: Yes (Sax 1984, p. 749)

Health Hazards (Acute, Delayed, and Chronic): Chlorophacinone is highly toxic orally and by skin absorption (Sax 1984, p. 749). The probable oral lethal dose for humans is less than 5 mg/kg to 50 mg/kg, or between a taste (less than 7 drops) and 1 teaspoonful for a 150 lb. (70 kg) person (Gosselin 1984, p. II-1335).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Small fires: dry chemicals, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Container may explode in heat of fire. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorities (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Coumarin Derivative

CHLOROPHACINONE

SECTION IV (continued)

Pesticide, Solid, n.o.s.) Fire may produce irriating or poisonous gases. Runoff from fire control water may give off poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated it emits toxic fumes of chlorides (Sax 1984, p. 748).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Anticoagulant rodenticide (Merck 1983, p. 302). Chronic acting, multiple dose rodenticide (Buchel 1983, p. 222).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Coumarin Derivative, Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CHLOROPHACINONE

(3691-35-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Yellow crystals.

Commercial Forms - Oil, powder.

Use - Rodenticide.

Other Names - 2-(p-Chlorophenyl)phenylacetyl-1,3-indandione; Drat; liphadione; Quick; Raviac; Topitox.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, Vitamin K (phytonadione).

Signs and Symptoms of Acute Chlorophacinone Exposure:

Warning: *Highly toxic by skin absorption.*

Chlorophacinone is an anticoagulant. Hemorrhage is the most common sign and may be manifested by nose and gum bleeding, bloody stools and urine, ecchymoses (extravasations of blood into skin), and hemoptysis (coughing up of blood). Bruising is heightened. Abdominal and flank pain may also occur.

CHLOROPHACINONE

Emergency Life-Support Procedures:

Acute exposure to chlorophacinone may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be used, as necessary. Rescue vehicle should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to chlorophacinone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to chlorophacinone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

CHLOROPHACINONE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of chlorophacinone is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- AMITON OXALATE

CAS Registry Number: 3734-97-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 150) Phosphorothioic Acid, S-(2-Diethylamino)ethyl) O,O-Diethyl Ester, Oxalate (1:1); Chipman 6199; Chipman R-6,199; Citram; S-(2-Diethylaminoethyl) O,O-Diethylphosphorothioate Hydrogenoxalate; O,O-Diethyl-S-(2-Diethylamino) Ethylphosphorothioate Hydrogen Oxalate; O,O-Diethyl S-(beta-Diethylamino)Ethyl Phosphorothiolate Hydrogen Oxalate; O,O-Diethyl S-(2-Ethyl-N,N-Diethylamino) Phosphorothioate Hydrogen Oxalate; ENT 20,993; Hydrogen Oxalate of Amiton; Tetram 75; Tetram, Acid Oxalate; Tetram Monooxalate

Chemical Formula: $C_{10}H_{24}NO_3PS \cdot C_2H_2O_4$

Molecular Weight: 359.42

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 208-210°F, 98-99°C (Merck 1983, p. 73)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

AMITON OXALATE

SECTION II (continued)

Solubility in Water: Not Found

Appearance and Odor: Crystals (Merck 1983, p. 73)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 1009)
Skin: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (Hawley 1981, p. 1009)

Health Hazards (Acute, Delayed, and Chronic): It is a cholinesterase inhibitor (Hawley 1981, p. 1009).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

AMITON OXALATE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as an insecticide (Hawley 1981, p. 1009).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

AMITON OXALATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Organophosphorus Pesticide) Symptoms include headache, giddiness, nervousness, blurred vision, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include sweating, miosis, tearing, salivation and other excessive respiratory tract secretion, vomiting, cyanosis, uncontrollable muscle twitching followed by muscular weakness, convulsions, coma, loss of reflexes, and loss of muscular control (Hayes 1982, p. 301).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

The following sources were searched but no information was found:

Sax 1984
NFPA 1984
ACGIH 1983-1984
NIOSH/OSHA 1978
Farm Chemicals Handbook 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Weast 1979
Doull 1980
Arena 1979

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHYL PHENKAPTON

CAS Registry Number: 3735-23-7

Synonyms (NIOSH-RTECS 1983 Synonyms, Volume 3, p. 140): Phosphorodithioic Acid, S-(((2,5-Dichlorophenyl)Thio)Methyl) O,O-Dimethyl Ester; S-(((2,5-Dichlorophenyl)Thio)Methyl) O,O-Dimethyl Phosphorodithioate; O,O-Dimethyl S-(2,5-Dichlorophenylthio)Methyl Phosphorodithioate; ENT 25,554-X; G 30494; Geigy 30494; Methanethiol, ((2,5-Dichlorophenylthio)-, S-Ester with O,O-Dimethyl Phosphorodithioate; Methyl Phencapton

Chemical Formula: $C_9H_{11}Cl_2O_2PS_3$

Molecular Weight: 349.25

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 11 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

METHYL PHENKAPTON

SECTION II (continued)

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Organic Phosphorus Insecticides) Organic phosphorus insecticides are absorbed by the skin, as well as by the respiratory and gastrointestinal tracts (Hayes 1982, p. 301). Toxic hazard rating (oral) is high (Sax 1984, p. 1904).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Cylinder may explode in heat of fire (DOT 1984, Guide 55). Heat may cause decomposition and evolution of highly toxic fumes of phosphorus oxides and chlorides (Sax 1984, p. 1904).

NFPA Flammability Rating: Not Found

METHYL PHENKAPTON

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Acaricide, insecticide (Farm Chemicals Handbook 1984, p. C-150). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. 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 containers and cover; move containers from spill area. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

METHYL PHENKAPTON

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Organic Phosphorus Insecticides) Symptoms are secondary to cholinesterase inhibition, headache, giddiness, blurred vision, nervousness, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include sweating, tearing, salivation, vomiting, cyanosis, convulsions, coma, loss of reflexes and loss of sphincter control (Hayes 1982, p. 302).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Buchel 1983
Clayton and Clayton 1981-82
Weast 1979
Hawley 1981
Encyc Occupat Health and Safety 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FUBERIDAZOLE

CAS Registry Number: 3878-19-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 577) Benzimidazole, 2-(2-Furyl)-; B-33172; BAY 33172; Bayer 33172; 1H-Benzimidazole, 2-(2-Furanyl)-; Fuberidatol; Fuberisazol; Fubridazole; Furidazol; Furidazole; 2-(2-Furyl)Benzimidazole; 2-(2'-Furyl)-Benzimidazole; Voronit; Voronite; W VII/117

Chemical Formula: $C_{11}H_8N_2O$

Molecular Weight: 184.21

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.33 mg/liter (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 543-550°F, 284-288°C (Farm Chemicals Handbook 1984, p. C108); 280°C decomposes (Worthing 1983, p. 296)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Practically insoluble (Farm Chemicals Handbook 1984, p. C108)

FUBERIDAZOLE

SECTION II (continued)

Appearance and Odor: Crystalline powder (Farm Chemicals Handbook 1984, p. C108)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1465)
Skin: Yes (Sax 1984, p. 1465)
Ingestion: Yes (Sax 1984, p. 1465)

Health Hazards (Acute, Delayed, and Chronic): It is classified as moderately toxic. Its probable oral lethal dose in humans is 0.5-5 g/kg or between 1 ounce and 1 pint for a 70 kg (150 lb.) person (Gosselin 1984, p. II-315).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is a fungicide (Buchel 1983, p. 314). Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is a fungicide (Buchel 1983, p. 314). Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1465).

NFPA Flammability Rating: Not Found

FUBERIDAZOLE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1465).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Uses include cereal seed dressing (Buchel 1983, p. 314); and fungicidal non-mercurial seed dressing with special action against fusarium (Farm Chemicals Handbook 1984, p. C108). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This compound is a fungicide (Buchel 1983, p. 314). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: This compound is a fungicide (Buchel 1983, p. 314). Move victim to fresh air; call emergency medical care. If

FUBERIDAZOLE

SECTION IX (continued)

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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Hawley 1981
Merck 1983
Hayes 1982
Weiss 1980
Weast 1979
DASE 1980
ACGIH 1983
NIOSH/OSHA 1978
Student 1981
Clayton and Clayton 1981-82
Doull 1980
NFPA 1984
Verschueren 1983
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BITOSCANATE

CAS Registry Number: 4044-65-9

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 585) Isothiocyanic Acid, 1,4-Phenylenedi-; Biscomate; 1,4-Diisothiocyanatobenzene; Isothiocyanic Acid p-Phenylene Ester; Jonit; Phenylene-1,4-Diisothiocyanate; Phenylene Thiocyanate

Chemical Formula: $C_8H_4N_2S_2$

Molecular Weight: 192.26

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 21 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 270°F, 132°C (Sax 1984, p. 2185)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Odorless, colorless crystals (Sax 1984, p. 2185).

BITOSCANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (NIOSH/RTECS 1983, Volume 2, p. 585)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic if ingested. It is a central nervous system and gastrointestinal toxin in humans (Sax 1984, p. 2185).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and sulfur oxides (Sax 1984, p. 2185).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

BITOSCANATE

SECTION V (continued)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Preparation and use as anthelmintic (Merck 1983, p. 182).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Cyanide or Cyanide Mixture, Dry) Move victim to fresh air; call emergency medical care. 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Weast 1979
Hayes 1975
Doull 1975
Weiss 1980
Verschueren 1983
Clayton and Clayton 1981-82
Physicians' Desk Reference 1985
Student 1981
NFPA 1984
Hayes 1982
Farm Chemicals Handboook 1984
Hawley 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ISOPHORONE DIISOCYANATE

CAS Registry Number: 4098-71-9

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 556): Isocyanic Acid, Methylene(3,5,5-Trimethyl-3,1-Cyclohexylene) Ester; Cyclohexane, 5-Isocyanato-1-(Isocyanatomethyl)-1,3,3-Trimethyl-; IPDI; 3-Isocyanatomethyl-3,5,5-Trimethylcyclohexylisocyanate; Isophorone Diamine Diisocyanate

Chemical Formula: $C_{12}H_{18}N_2O_2$

Molecular Weight: 222.32

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.26 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

ISOPHORONE DIISOCYANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.09 mg/m^3 (0.01 ppm) (skin); to be changed to TWA 0.045 mg/m^3 (0.005 ppm) (ACGIH 1986-87, pp. 21 and 36)

IDLH: Not Found

Other Limits Recommended: Occupational exposure to diisocyanates recommended standard - Air: TWA 5 ppb; Ceiling limit 20 ppb/10 minutes (NIOSH/RTECS 1983, Volume 2, p. 556).

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1648)
Skin: Yes (Sax 1984, p. 1648)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by inhalation and moderately toxic through the skin (Sax 1984, p. 1648).

Medical Conditions Generally Aggravated by Exposure: (Non-Specific -- Isocyanates) People with skin or respiratory problems should avoid exposure (Encyc Occupat Health and Safety 1983, p. 1162).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1648).

NFPA Flammability Rating: Not Found

ISOPHORONE DIISOCYANATE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of nitrogen oxides (Sax 1984, p. 1648).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Isocyanates)
Isocyanates can cause itching and skin rashes, tearing of the eyes, inflammation of the mucous membrane of the nose, and lung problems (Encyc Occupat Health and Safety 1983, p. 1161).

ISOPHORONE DIISOCYANATE

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSACETIM

CAS Registry Number: 4104-14-7

Synonyms: Phosphoramidothioic Acid, Acetimidoyl-, O,O-bis(p-Chlorophenyl) Ester; BAY 38819; Bayer 38819; DRC-714; Gophacide; Phosazetim; Phosphoramidothioic Acid, (1-Iminoethyl)-, O,O-bis(4-Chlorophenyl) Ester

Chemical Formula: $C_{14}H_{13}Cl_2N_2O_2PS$

Molecular Weight: 375.22

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 3.7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

PHOSACETIM

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 464)
Ingestion: Yes (Sax 1984, p. 464)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic by mouth and skin exposure (Sax 1984, p. 464).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, emits toxic fumes, primarily chlorides and oxides of nitrogen, sulfur and phosphorus (Sax 1984, p. 464).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Extreme heat (Sax 1984, p. 464)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, emits toxic fumes, primarily chlorides and oxides of nitrogen, phosphorus and sulfur (Sax 1984, p. 464).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

PHOSACETIM

SECTION V (continued)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid skin contact (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:
DOT 1984
Hawley 1981
Hayes 1982
Merck 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CROTONALDEHYDE

CAS Registry Number: 4170-30-3

Synonyms: 2-Butenal; Crotonal; Crotonic Aldehyde; Crotylaldehyde

Chemical Formula: C_4H_6O

Molecular Weight: 70.09

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.2 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 219°F, 104°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.853 at 20°C (*Merck 1976)

Vapor Pressure (mmHg): 19 at 20°C/20°C (*Merck 1976)

Melting Point: -105°F, -76.5°C (*Merck 1976)

Vapor Density (AIR=1): 2.41 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 18.1 g/100 mL (Merck 1983, p. 372)

Appearance and Odor: Water-white to straw-colored liquid (*NFPA 1978); pungent, suffocating odor (*Hawley 1977).

CROTONALDEHYDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Gosselin 1976, p. II-186)
Skin: Yes (Gosselin 1976, p. II-186)
Ingestion: Yes (Gosselin 1976, p. II-186)

Health Hazards (Acute, Delayed, and Chronic): This compound is an extreme eye, respiratory, and skin irritant and can cause corneal damage (*NFPA 1978). A 15 minute exposure at 4.1 ppm is highly irritating to the nose and upper respiratory tract and causes tearing. Brief exposure at 45 ppm proved very disagreeable with prominent eye irritation (*ACGIH 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 55°F (OC) (*Hawley 1977)
Flammable Limits:
LEL: 2.95% v/v (Merck 1983, p. 372)
UEL: 15.5% v/v (Merck 1983, p. 372)

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray and foam. Large fires: water spray, fog or foam (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk. Dike fire control water for later disposal; do not scatter the material. Spray cooling water on containers that are exposed to flames until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Isolate for one-half mile radius if tank car or truck is involved in fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: Flammable/combustible material; may be ignited by heat, sparks or flames. Vapor may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard.

NFPA Flammability Rating: 3

CROTONALDEHYDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Merck 1976)

Conditions to Avoid: Readily resinifies to dimer when pure and slowly oxidizes to crotonic acid (*Merck 1976). Altered by light and air (*Hawley 1977).

Incompatibility (Materials to Avoid): Readily converted by oxygen to hazardous peroxides and acids (*NFPA 1978) and is incompatible with caustics, ammonia, organic amines, mineral acids, and strong oxidizers (NIOSH/OSHA 1978, p. 72).

Hazardous Decomposition or Byproducts: Peroxides and acids (*NFPA 1978).

Hazardous Polymerization: May Occur: Yes (*NFPA 1978)
May Not Occur:

Conditions to Avoid: Polymerization may take place at high temperatures (*NFPA 1978).

SECTION VI -- USE INFORMATION

Chemical intermediate for n-butanol, n-butyraldehyde, crotonic acid, and sorbic acid (*SRI); intermediate for 2-ethylhexyl alcohol, solvent, insecticides, tear gas, organic synthesis, and leather tanning (*Hawley 1977). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CROTONALDEHYDE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED
CPE	POOR/LIMITED
Neoprene	POOR/LIMITED
Teflon	GOOD/LIMITED
Viton	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Irritated eyes, repiratory distress, and skin irritation (NIOSH/OSHA 1978, p. 72).

Emergency and First Aid Procedures: Exposed skin or eyes should be washed with copious amounts of water for 15 minutes. Remove contaminated clothing (*Rumack 1975 to Present). If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep victim quiet and maintain normal body temperature. Effects may be delayed, keep victim under observation (DOT 1984, Guide 28).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FLUENETIL

CAS Registry Number: 4301-50-2

Synonyms: (SANSS 1983 Synonyms) 4-Biphenylacetic Acid, 2-Fluoroethyl Ester; [1,1'-Biphenyl]-4-Acetic Acid, 2-Fluoroethyl Ester; beta-Fluoroethyl 4-Biphenylacetate; Fluenethyl; Lambrol; M 2060; Mytrol; TH 367-1; 2-Fluoroethyl 4-Biphenylacetate (ACN)

Chemical Formula: $C_{16}H_{15}FO_2$

Molecular Weight: 258.31

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 6 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

FLUENETIL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Fluenitil is highly toxic to mammals (Buchel 1983, p. 177).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is an insecticide (Buchel 1983, p. 177). Methods for liquid insecticides are as follows. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is an insecticide (Buchel 1983, p. 177). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

FLUENETIL

SECTION V (continued)

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material has been used as an acaricide and insecticide (Farm Chemicals Handbook 1984, p. C-133). Its main use was as a dormant spray for orchard fruit. It is no longer made (Buchel 1983, p. 177). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This compound is an insecticide (Buchel 1983, p. 177). Procedures for liquid insecticides are as follows. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: This compound is an insecticide (Buchel 1983, p. 177). For liquid insecticides, move victim to fresh air; 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

FLUENETIL

SECTION IX (continued)

be delayed; keep victim under observation (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHENOL, 2,2'-THIOBIS[4-CHLORO-6-METHYL-

CAS Registry Number: 4418-66-0

Synonyms: o-Cresol, 6,6'-Thiobis[4-Chloro-; Chlorbisan; 2,2'-Dihydroxy-3,3'-Dimethyl-5,5'-Dichlorodiphenyl Sulfide; Orbisan; 2,2'-Thiobis(4-Chloro-6-Methylphenol)

Chemical Formula: $C_{14}H_{12}Cl_2O_2S$

Molecular Weight: 315.22

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 1.3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 175°C (Merck, p. 3928)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

PHENOL, 2,2'-THIOBIS[4-CHLORO-6-METHYL-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1068)

Health Hazards (Acute, Delayed, and Chronic): This compound is highly toxic by ingestion (Sax 1984, p. 1068).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition it emits very toxic fumes of sulfur oxides and chlorine containing compounds (Sax 1984, p. 1068).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits very toxic fumes of sulfur oxides and chlorine containing compounds (Sax 1984, p. 1068).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PHENOL, 2,2'-THIOBIS[4-CHLORO-6-METHYL-

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

The following sources were searched but no information found:
Hawley 1981
Hayes 1982
Merck Index 1983
Clayton and Clayton 1981-82
Buchel 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HEXAMETHYLENEDIAMINE, N,N'-DIBUTYL-

CAS Registry Number: 4835-11-4

Synonyms: N,N'-Dibutyl-1,6-Hexanediamine; 1,6-Hexanediamine, N,N'-Dibutyl-; 1,6-N,N'-Dibutylhexanediamine; N,N'-Dibutylhexamethylenediamine

Chemical Formula: $C_{14}H_{32}N_2$

Molecular Weight: 228.42

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.22 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 204°C at 760 mmHg (Weast 1987, p. C303)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Non-Specific -- Corrosive Alkali) (Gosselin 1984, p. III-245)
Ingestion: Yes (Non-Specific -- Corrosive Alkali) (Gosselin 1984, p. III-245)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Corrosive Alkali) Acute circulatory shock; burns in mouth, throat, and esophagus; suffocation due to glottal or laryngeal swelling; perforation and inflammation of the esophagus and the tracheobronchial tree; aspiration pneumonia. Delayed stricture (scar) formation causing problems with swallowing, and stomach filling and emptying; strong alkalis are markedly corrosive and penetrating to skin and mucous membranes (Gosselin 1984, p. III-245).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Alkylamine, n.o.s. (Corrosive)) This material may react violently with water. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 60).

Special Fire Fighting Procedures: (Non-Specific -- Alkylamine, n.o.s. (Corrosive)) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full-protective clothing (DOT 1984, Guide 60).

Unusual Fire and Explosion Hazards: (Non-Specific -- Alkylamine, n.o.s. (Corrosive)) Flammable or poisonous gases may accumulate in tanks or hopper cars (DOT 1984, Guide 60).

NFPA Flammability Rating: Not Found

HEXAMETHYLENEDIAMINE, N,N'-DIBUTYL-

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Alkylamine, n.o.s. (Corrosive)) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 60).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED**
Neoprene	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This material is a corrosive alkali (*Rumack 1975 to Present) By ingestion, visible burns in mouth, drooling, gagging, vomiting, chest and upper abdominal pain, difficulty in breathing or apnea (respiratory arrest), collapse and cardiac arrest may occur (Gosselin 1984, p. III-245).

Emergency and First Aid Procedures: For oral ingestion, dilute immediately with milk or water. Avoid vomiting. For inhalation exposure, establish respiration and administer oxygen. For skin or eye exposure, irrigate copiously with water for at least 15 minutes (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PIPROTAL

CAS Registry Number: 5281-13-0

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 595) 1,3-Benzodioxole, 6-(bis(2-(2-Butoxyethoxy)Ethoxy)Methyl)-; Heliotropin Acetal; Piperonal Bis(2-(2-Butoxyethoxy)ethyl)acetal; Tropital

Chemical Formula: $C_{24}H_{40}O_8$

Molecular Weight: 456.64

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 4.4 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

PIPROTAL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PIPROTAL

SECTION VI -- USE INFORMATION

Insecticide, structurally related to piperonyl butoxide (Hayes 1982, p. 113). Synergist for pyrethroids (Buchel 1983, p. 21). Product discontinued (Farm Chemicals Handbook 1984, p. C-236).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENT

Sources searched but no information was found:

Clayton and Clayton 1981-82
Merck 1983
Sax 1984
Verschueren 1983
Weast 1979
DOT 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THIOUREA, (2-CHLOROPHENYL)-

CAS Registry Number: 5344-82-1

Synonyms: Urea, 1-(o-Chlorophenyl)-2-Thio-; 2-Chlorophenylthiourea; (o-Chlorophenyl)thiourea; 1-(2-Chlorophenyl)thiourea; 1-(o-Chlorophenyl)-thiourea; N-(2-Chlorophenyl)thiourea; 1-(2 Chlorophenyl)-2-Thiourea

Chemical Formula: $C_7H_7ClN_2S$

Molecular Weight: 186.67

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 4.6 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 294.8-295.7°F, 146-146.5°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Needles or plates (*Weast 1979)

THIOUREA, (2-CHLOROPHENYL)-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 764)

Health Hazards (Acute, Delayed, and Chronic): High oral toxicity (Sax 1984, p. 764).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits very toxic fumes of chlorides, nitrogen oxides, and sulfur oxides (Sax 1984, p. 764).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

THIOUREA, (2-CHLOROPHENYL)-

SECTION VI -- USE INFORMATION

This material is an herbicide (Iramer, C.R., Biochem. Physiol. Pflanz 117(6)515 (1982)). Not registered as a pesticide in the U.S. (USEPA/Active Ingredients 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Thiourea) Do not touch 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Thiourea) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- COUMATETRALYL

CAS Registry Number: 5836-29-3

Synonyms: 2H-1-Benzopyran-2-one, 4-Hydroxy-3-(1,2,3,4-Tetrahydro-1-Naphthalenyl)-; 3-(alpha-Tetral)-4-Oxycoumarin; 3-(alpha-Tetralyl)-4-Hydroxycoumarin; 3-(D-Tetralyl)-4-Hydroxycoumarin; 4-Hydroxy-3-(1,2,3,4-Tetrahydro-1-Naphthalenyl)-2H-1-Benzopyran-2-one; 4-Hydroxy-3-(1,2,3,4-Tetrahydro-1-Naphthyl)-Cumarin; 4-Hydroxy-3-(1,2,3,4-Tetrahydro-1-Naphthyl)Coumarin; Bayer 25 634; Coumarin, 4-Hydroxy-3-(1,2,3,4-Tetrahydro-1-Naphthyl)-; Endox; Endrocid; Endrocide; Racumin; Racumin 57; Raucumin 57; Rodentin

Chemical Formula: $C_{19}H_{16}O_3$

Molecular Weight: 292.35

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 16.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 349°F, 176°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

COUMATETRALYL

SECTION II (continued)

Solubility in Water: Practically insoluble (*Worthing 1979)

Appearance and Odor: Yellowish-white crystalline powder; colorless when pure; odorless (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) (DOT 1984, Guide 55)
Skin: Yes (*Encyc Occupat Health and Safety 1971)
Ingestion: Yes (Physicians' Desk Reference 1980, p. 1031)

Health Hazards (Acute, Delayed, and Chronic): Overdosage with anticoagulants may cause acute bleeding (Physicians' Desk Reference 1980, p. 1031).

Medical Conditions Generally Aggravated by Exposure: Pre-existing blood clotting disease or liver disease (*Morgan 1976).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) This material may burn but does not ignite readily. Fire and runoff from fire control water may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Container may explode in heat of fire (DOT 1984, Guide 55).

COUMATETRALYL

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Enolic form of compound has acidic properties and can form salts with metals (*Spencer 1982).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Courmatetralyl is used as a rodenticide (*Encyc Occupat Health and Safety 1971), functioning as an anticoagulant that does not induce bait-shyness (*Worthing 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material. Use water spray to reduce vapors. With clean shovel place material into clean, dry container and cover. Dike far ahead of large spills for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED**
Butyl/Neoprene	POOR/LIMITED**

COUMATETRALYL

SECTION VIII (continued)

CPE	GOOD/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Coumarin derivatives present no danger to man under ordinary conditions of use, but can produce hemorrhage if absorbed in large or repeated quantities (*Encyc Occupat Health and Safety 1971).

Emergency and First Aid Procedures: Ingestion: induce vomiting with syrup of ipecac if victim ingested anticoagulant rodenticide within the preceding 2-3 hours (Morgan 1976). (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THALLOUS CARBONATE

CAS Registry Number: 6533-73-9

Synonyms: Thallium(I) Carbonate(2:1); Dithallium Carbonate; Carbonic Acid, Dithallium (1+) Salt; Thallium Carbonate; Thallium Carbonate (Tl2CO3)

Chemical Formula: $CO_3 \cdot 2Tl$

Molecular Weight: 468.78

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 21 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): In Thallium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 7.1 (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: 522°F, 272°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 24 parts water, 3.7 parts boiling water (*Merck 1976)

Appearance and Odor: Heavy, shiny, colorless or white crystals (*Hawley 1977)

THALLOUS CARBONATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Thallium, soluble compounds) TWA 0.1 mg/m^3, as thallium (NIOSH 1987, p. 224)

ACGIH TLV: (Thallium, soluble compounds) TWA 0.1 mg/m^3, as thallium (skin) (ACGIH 1986-87, p. 31)

IDLH: Not Found

Other Limits Recommended: IDLH for thallium, soluble compounds 20 mg/m^3 (NIOSH 1987, p. 224)

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (Sax 1984, p. 2556)

Health Hazards (Acute, Delayed, and Chronic): Thallium is a digestive tract irritant and nervous system toxicant (Doull 1980, p. 457). It is classified as extremely toxic. Probable oral lethal dose (humans) is 5-50 mg/kg, or between 7 drops and 1 teaspoon for 70 kg person (150 lb.) (*Gosselin 1976). Teratogenic effects are noted after chronic intoxication (*Venugopal 1978).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Thallium Salts, n.o.s.) Extinguish with dry chemicals, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Thallium Salts, n.o.s.) Move container from fire area if you can do so without risk. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of thallium (Sax 1984, p. 2556). (Non-Specific -- Thallium Salts, n.o.s.) Fire may produce irritating or poisonous gases (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

THALLOUS CARBONATE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of thallium (Sax 1984, p. 2556).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacture of imitation diamonds (*Merck 1976). Also used in analysis to test for carbon disulfide (*Hawley 1977). Used as a fungicide (*Venugopal 1978).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill. For small quantities, sweep onto paper or other suitable material, place in sealed container for disposal. Large quantities may be reclaimed. If this is not practical, collect in most convenient and safe manner and deposit in sealed containers. For liquids absorb in vermiculite, dry sand, earth or similar material and place in sealed containers for disposal (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

**Based on a chemical analog.

THALLOUS CARBONATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms appear within 12-24 hours after a single toxic dose or after several weeks of small daily doses. In acute poisoning dominant symptoms include severe stomach cramps, vomiting and diarrhea. In severe cases nervous system damage may be indicated by tremors, delirium, convulsions, paralysis, and coma culminating in death. Symptoms of subacute poisonings include stomach cramps, nausea, vomiting, diarrhea, leg pains, tremors, and tingling sensations in the hands and feet. Damage to nervous system may be permanent (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Thallium Salts, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contamiated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MONOCROTOPHOS

CAS Registry Number: 6923-22-4

Synonyms: (E)-Dimethyl 1-Methyl-3-(Methylamino)-3-Oxo-1-Propenyl Phosphate; (E)-Phosphoric Acid Dimethyl Ester, Ester with 3-Hydroxy-N-Methylcrotonamide; 3-(Dimethoxyphosphinyloxy)-N-Methyl-cis-Crotonamide; 3-(Dimethoxyphosphinyloxy) -N-Methylisocrotonamide; 3-(Dimethoxyphosphinyloxy) N-Methyl-cis-Crotonamide; 3-Hydroxy-N-Methyl-cis-Crotonamide Dimethyl Phosphate; 3-Hydroxy-N-Methylcrotonamide Dimethyl Phosphate; Azodrin; Azodrin Insecticide; Bilobran; C 1414; Ciba 1414; cis-1-Methyl-2-Methyl Carbamoyl Vinyl Phosphate; Crisodrin; Crotonamide, 3-Hydroxy-N-Methyl-, Dimethylphosphate, (E)-; Dimethyl 1-Methyl-2-(Methylcarbamoyl)Vinyl Phosphate, cis-; Dimethyl 2-Methylcarbamoyl-1-Methylvinyl Phosphate; Dimethyl Phosphate Ester of 3-Hydroxy-N-Methyl-cis-Crotonamide; Dimethyl Phosphate of 3-Hydroxy-N-Methyl-cis-Crotonamide; ENT 27,129; Monocron; N-Desmethyl Bidrin; N-Methyl Bidrin; Nuvacron; Nuvacron 20; Phosphoric acid, Dimethyl 1-Methyl-3-(Methylamino)-3-Oxo-1-Propenyl Ester, (E)-; Phosphoric Acid, Dimethyl Ester, Ester with (E)-3-Hydroxy-N-Methylcrotonamide; Phosphoric acid, Dimethyl Ester, Ester with 3-Hydroxy-N-Methylcrotonamide, (E)-; Phosphoric Acid, Dimethyl Ester, Ester with cis-3-Hydroxy-N-Methylcrotonamide; Pillardrin; Plantdrin; SD 9129; Shell SD 9129; Susvin

Chemical Formula: $C_7H_{14}NO_5P$

Molecular Weight: 223.16

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.063 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 257°F, 125°C at 0.0005 mmHg (Worthing 1983)

MONOCROTOPHOS

SECTION II (continued)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.000007 at 20°C (*Merck 1983)

Melting Point: 129-131°F, 54-55°C (crystals) (*Merck 1983); 77-86°F, 25-30°C (commercial product) (Merck 1983, p. 894)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Merck 1983)

Appearance and Odor: Colorless crystals with a mild ester odor (*Hartley 1983; *Spencer 1982); commercial product is a reddish-brown solid (Merck 1983, p. 894)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.25 mg/m^3 (*ACGIH 1983)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Farm Chemicals Handbook 1984)
Skin: Yes (Hayes 1982, p. 360)
Ingestion: Yes (Hayes 1982, p. 360)

Health Hazards (Acute, Delayed, and Chronic): Monocrotophos is an organophosphorus pesticide. It is a cholinesterase inhibitor and acts on the nervous system (Hayes 1982, p. 360). Extremely toxic; probable oral lethal dose to humans 5-50 mg/kg or between 7 drops and 1 teaspoon for a 70 kg (150 lb.) person (*Gosselin 1984). Repeated inhalation or skin contact with this material may, without symptoms, progressively increase susceptibility to poisoning (*Farm Chemicals Handbook 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Above 200°F (CC) (Farm Chemicals Handbook 1984, p. C156)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Like other organophosphorus pesticides (*Morgan 1982) extinguish with dry chemical, carbon dioxide, water spray, fog, or

MONOCROTOPHOS

SECTION IV (continued)

foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Like other organophosphorus pesticides (*Morgan 1982) move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Wear positive pressure breathing apparatus and full protective clothing (*Farm Chemicals Handbook 1984). Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes. Unstable in aqueous solution above pH 7.0; in low molecular weight alcohols and glycols (*Worthing 1979)
Stable: Yes. Stable in ketones and higher molecular weight alcohols and glycols (*Worthing 1979).

Conditions to Avoid: Stable when stored in glass or polyethylene containers. Relatively stable in sunlight (Farm Chemicals Handbook 1984, p. C156). Keep away from temperatures above 80°F; do not store below 70°F. Corrosive to black iron, drum steel, stainless steel 304 and brass, but not to glass, aluminum, or stainless steel 316 (*Worthing 1979).

Incompatibility (Materials to Avoid): Incompatible with alkaline compounds (*Worthing 1979).

Hazardous Decomposition or Byproducts: Toxic fumes evolved when heated to decomposition (*Sax 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Monocrotophos is a fast acting insecticide with both systemic and contact action used against a wide range of pests on cotton, sugar cane, tobacco, potatoes, peanuts, tomatoes, and ornamentals (*Worthing 1979; *Farm Chemicals Handbook 1984).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

As with other organophosphorus pesticides (*Morgan 1982), do not touch spilled material; stop leak if you can do it without risk.

MONOCROTOPHOS

SECTION VII (continued)

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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for MONOCROTOPHOS

(6923-22-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless crystals.

Odor - Mild, sweet.

Commercial Forms - Reddish-brown semisolid, water-soluble concentrate, mixture, granules.

Use - Pesticide.

Other Names - Azodrin; Bilobran; (E)-dimethyl 1-methyl-3-(methylamino)-3-oxo-1-propenyl phosphate; ENT 27129; Monocron; Nuvacron; Pillardrin; Plantdrin.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Monocrotophos Exposure:

Note: Monocrotophos is a cholinesterase inhibitor.

Acute exposure to monocrotophos may result in the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) may occur, although hypertension (high blood pressure) is not uncommon. Chest pain may be noted. Dyspnea (shortness of breath) may lead to respiratory collapse. Giddiness is common.

MONOCROTOPHOS

Emergency Life-Support Procedures:

Acute exposure to monocrotophos may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to monocrotophos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to monocrotophos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

MONOCROTOPHOS

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of monocrotophos is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of monocrotophos may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SULFUR DIOXIDE

CAS Registry Number: 7446-09-5

Synonyms: Sulfur Oxide; Sulfurous Acid Anhydride; Sulfurous Anhydride; Sulfurous Oxide; Sulphur Dioxide

Chemical Formula: SO_2

Molecular Weight: 64.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 14°F, -10°C (*Merck 1976)

Specific Gravity (H_2O=1): Liquid: 1.434 (*Weast 1979)

Vapor Pressure (mmHg): 2432 at 68°F (*Hawley 1977)

Melting Point: -98.9°F, -72.7°C (*Weast 1979)

Vapor Density (AIR=1): 2.26 (*General Electric Co. 1979, MSDS #50)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 17.7% at 0°C; 11.9% at 15°C; 8.5% at 25°C; 6.4% at 35°C (*Merck 1976)

SULFUR DIOXIDE

SECTION II (continued)

Appearance and Odor: Colorless liquid or gas with a strong suffocating odor (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 5 ppm (13 mg/m^3) (NIOSH/OSHA 1978, p. 168)

ACGIH TLV: TWA 2 ppm (5 mg/m^3); STEL 5 ppm (10 mg/m^3) (ACGIH 1985, p. 30)

IDLH: 100 ppm (*NIOSH/OSHA 1981)

Other Limits Recommended: NIOSH: 0.5 ppm, 10-hour TWA (NIOSH 1987, p. 212). EEGL 10.0 ppm (60 minutes) (NRC 1984b, pp. 95-102).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): It may cause death or permanent injury after very short exposure to small quantities (*Sax 1975). 1,000 ppm causes death in from 10 minutes to several hours by respiratory depression (*Thienes 1972). It is an eye and respiratory tract irritant (*Grant 1974; *Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Persons with asthma, subnormal pulmonary functions or cardiovascular disease are at a greater risk (*OSHA 1977 Public hearing on occupational standard for sulfur dioxide (PB83-182485); *Encyc Occupat Health and Safety 1971).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not flammable (Weiss 1980, p. 841). Extinguish fires with dry chemical, carbon dioxide, water spray, fog or foam (*DOT 1984).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and full protective clothing. Move container from fire area. Stay away from ends of tanks. Cool containers that are exposed to flames with water from the side until well after the fire is out. Isolate area until gas has dispersed. Keep unnecessary people away (*DOT 1984).

Unusual Fire and Explosion Hazards: Containers may explode in heat of fire (*DOT 1984), or they may rupture and release irritating toxic sulfur dioxide (*CHRIS 1978). Sulfur dioxide has explosive properties when it comes in contact with sodium hydride; potassium chlorate at elevated

SULFUR DIOXIDE

SECTION IV (continued)

temperatures; ethanol; ether; zinc ethylsulfurinate at very cool temperatures (-15°C); fluorine; chlorine trifluoride and chlorates (*Bretherick 1979; *NFPA 1978). It will react with water or steam to produce toxic and corrosive fumes (*Sax 1975).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Ammonia (*General Electric Co. 1979, MSDS #50); monocesium or monopotassium acetylide; dicesium monoxide; iron (II) oxide; tin oxide; lead (IV) oxide; chromium; manganese; molten sodium (*Bretherick 1979); powder aluminum and rubidium (*NFPA 1978). Sulfur dioxide has explosive properties when it comes in contact with sodium hydride; potassium chlorate at elevated temperatures; ethanol; ether; zinc ethylsulfurinate at very cool temperatures (-15C); fluorine; chlorine trifluoride and chlorates (*Bretherick 1979; *NFPA 1978). It will react with water or steam to produce toxic and corrosive fumes (*Sax 1975).

Hazardous Decomposition or Byproducts: When the liquid is heated it may release irritating, toxic sulfur dioxide gas (*CHRIS 1978).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 891)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used in preserving fruits and vegetables (*Merck 1976). Chemical intermediate for various organic syntheses (*SRI); antioxidant (*Patty 1963); bleaching agent; inhibitor for various reactions in manufacturing process; solvent and refrigerant (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away. Stay upwind and out of low areas. In case of spills or leaks, stop leak if you can do so without risk. Use water spray to reduce vapor but do not put water on the spill (*DOT 1984).

SULFUR DIOXIDE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for SULFUR DIOXIDE

(7446-09-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless gas or liquid under pressure.

Odor - Strong, suffocating.

Commercial Form - Liquefied gas in 2- to 300-lb pressure cylinders, ton drums on multi-unit cars, 40,000-lb tank cars.

Uses - Fruit and vegetable preservative, antioxidant, bleaching agent, solvent, refrigerant, organic synthesis, inhibitor for various reactions in manufacturing.

Caution: *Explosion potential is high upon contact with a variety of chemicals. To ensure safety, exit from areas where sulfur dioxide may be present before instituting emergency life-support procedures.*

Other Names - Sulfur oxide, sulfurous acid anhydride, sulfurous anhydride, sulfurous oxide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate.

SULFUR DIOXIDE

Signs and Symptoms of Acute Sulfur Dioxide Exposure:

Note: Persons with asthma, subnormal pulmonary function, or cardiovascular disease are at greater risk.

Sulfur dioxide may irritate the eyes and respiratory tract. Signs and symptoms of acute exposure to sulfur dioxide may be severe and include coughing, choking, dyspnea (shortness of breath), sneezing, wheezing, and chest discomfort. Upper airway edema (swelling) or obstruction, bronchoconstriction, pneumonia, pulmonary edema, and respiratory paralysis may occur. Fatigue may be noted.

Gastrointestinal effects may include nausea, vomiting, and abdominal pain. Cyanosis (blue tint to skin and mucous membranes) may be noted following exposure to sulfur dioxide.

Emergency Life-Support Procedures:

Acute exposure to sulfur dioxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to sulfur dioxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to sulfur dioxide.

SULFUR DIOXIDE

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SULFUR TRIOXIDE

CAS Registry Number: 7446-11-9

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 677): Sulfan; Sulfuric Anhydride; Sulfuric Oxide

Chemical Formula: SO_3

Molecular Weight: 80.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (guinea pig) 0.03 mg/liter/6 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 113°F, 45°C (all forms) (Hawley 1981, p. 983)

Specific Gravity (H_2O=1): Alpha form: 1.97 at 30°C; Gamma form (liquid): 1.920 at 20°C/4°C (Weast 1979, pp. B-132 - B-133)

Vapor Pressure (mmHg): Alpha form: 73 at 25°C; Beta form: 344 at 25°C; Gamma form: 433 at 25°C (Merck 1983, p. 1289)

Melting Point: Alpha form: 144°F, 62°C; Beta form: 90.5°F, 32.5°C; Gamma form: 62.2°F, 16.8°C (Hawley 1981, p. 983)

Vapor Density (AIR=1): 2.76 (Sax 1984, p. 2492)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water (Weast 1978, p. B172)

Appearance and Odor: Alpha form and Beta form: asbestos-like needles;

SULFUR TRIOXIDE

SECTION II (continued)

Gamma form: ice-like mass or liquid (Merck 1983, p. 1289)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2492)
Skin: Not Found
Ingestion: Yes (DOT 1984, Guide 39)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic (Hawley 1981, p. 983). It is an irritant and corrosive to mucous membranes (Merck 1983, p. 1289). Poisonous if inhaled or swallowed. Contact causes severe burns to skin and eyes (DOT 1984, Guide 39).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Do not get water inside container. Small fires: dry chemical or carbon dioxide. Large fires: flood fire area with water from a distance. Do not get solid stream of water on spilled material. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 39).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 39).

Unusual Fire and Explosion Hazards: Fire risk in contact with organic materials. An explosive increase in vapor pressure occurs when the alpha form melts (Hawley 1981, p, 983). Combines with water with explosive violence, forming sulfuric acid (Merck 1983, p. 1289). May ignite other combustible materials (wood, paper, oil, etc.). Flammable poisonous gases may accumulate in tanks and hopper cars. Runoff to sewer may create fire or explosion hazard (DOT 1984, Guide 39).

NFPA Flammability Rating: Not Found

SULFUR TRIOXIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: On exposure to air, it absorbs moisture and emits dense white fumes (Merck 1983, p. 1289).

Incompatibility (Materials to Avoid): Water and organic materials (Hawley 1981, p. 983)

Hazardous Decomposition or Byproducts: Forms sulfuric acid on contact with water (Merck 1983, p. 1289).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used in the sulfonation of organic compounds and in solar energy collectors (Hawley 1981, p. 983). It is an intermediate in sulfuric acid manufacture and in the manufacture of explosives (Merck 1983, p. 1289).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). Do not get water inside container; stop leak if you can do so without risk. Do not touch spilled material. Use water spray to reduce vapors but do not put water on leak or spill area. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Dike spill for later disposal; do not apply water unless directed to do so. Clean up only under supervision of an expert (DOT 1984, Guide 39).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This material may cause coughing, choking, and severe discomfort at a concentration of 1 ppm (Merck 1983, p. 1289).

SULFUR TRIOXIDE

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. Speed in removing material from skin is of extreme importance. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 39).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THALLOUS SULFATE

CAS Registry Number: 7446-18-6

Synonyms: (NIOSH/RTECS 1983 SYNONYMS, VOLUME 3, p. 706) Thallium(I)Sulfate(2:1); C.F.S.; CSF-Giftweizen; Dithallium Sulfate; Dithallium(1+) Sulfate; M7-Giftkoerner; Rattengiftkonserve; Sulfuric Acid, Dithallium(1+) Salt; Sulfuric Acid, Thallium(1+) Salt (1:2); Thallium Sulfate; Thallium(I) Sulfate (Hayes 1982 Synonyms, p. 25) Bonide Antzix ant killer (trademark); GTA ant bane(trademark); GTA bait(trademark); Magikil Jelly ant bait(trademark); Martin's Rat-Stop(trademark); Liquid Mission Brand ant-roach killer(trademark); Rex ant bait(trademark)

Chemical Formula: Tl_2SO_4

Molecular Weight: 504.80

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 20.3 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): In Thallium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes (Weast 1979, p. B-134)

Specific Gravity (H_2O=1): 6.77 (Weast 1979, p. B-134)

Vapor Pressure (mmHg): Inappreciable (Hayes 1982, p. 25)

Melting Point: 1170°F, 632°C (Weast 1979, p. B-134)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

THALLOUS SULFATE

SECTION II (continued)

Solubility in Water: 4.87 g/100 ml at 20°C, 19.14 g/100 ml at 100°C (Weast 1979, p. B-134)

Appearance and Odor: White rhomboid prisms to a colorless dense powder; odorless (Hayes 1982, p. 25; Merck 1983, p. 1325; Hawley 1981, p. 1013)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Thallium Soluble Compounds) TWA 0.1 mg/m^3, as thallium (skin) (OSHA 1984, p. 663)

ACGIH TLV: (Thallium Soluble Compounds) TWA 0.1 mg/m^3, as thallium (skin) (ACGIH 1985, p. 31)

IDLH: (Thallium Compounds, Soluble) 20 mg/m^3 (NIOSH/OSHA 1978, p. 178)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2557)

Health Hazards (Acute, Delayed, and Chronic): Rated as extremely toxic. The probable oral lethal dose in humans is 5 to 50 mg/kg, or between 7 drops and 1 teaspoon for a 150-pound person (Gosselin 1984, p. II-139). The mean lethal dose in an adult is probably about 1 gm of thallium sulfate (Gosselin 1984, p. III 380). Chronic exposure causes hair loss starting 10 days after exposure and complete baldness in about a month (Clayton and Clayton 1981-82, p. 1922).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Thallium Salts, n.o.s.) If material is involved in fire, extinguish fire using agent suitable for type of surrounding fire (material itself does not burn). Use water in flooding quantities as fog. Use foam, carbon dioxide or dry chemical (Student 1981, p. 497). For small fires use dry chemical, carbon dioxide, water spray, or foam. For large fires use water spray, fog, or foam. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Thallium Salts, n.o.s.) For personnel protection avoid breathing dusts, and fumes from burning material. Keep upwind. Avoid bodily contact with the material.

THALLOUS SULFATE

SECTION IV (continued)

Wear boots, protective gloves, and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Wear self-contained breathing apparatus when fighting fires involving this material. If contact with the material is anticipated, wear full protective clothing (Student 1981, p. 497). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of thallium and sulfur oxide (Sax 1984, p. 2557).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of thallium and sulfur oxides (Sax 1984, p. 2557).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a rat poison, as ant bait and as a reagent in analytical chemistry (Merck 1983, p. 1325). Also used for analysis (testing for iodine in the presence of chlorine); ozonometry; rodenticide; and pesticide (Hawley 1981, p. 1013). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Thallium Salts, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 53).

THALLOUS SULFATE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Can cause death due to shock. Dominant effects include severe abdominal pain, vomiting and diarrhea. Blood in vomitus and stools are often seen. In severe cases, tremors, delirium, convulsions, paralysis, coma and even death may occur (Gosselin 1984, p. III-381).

Emergency and First Aid Procedures: (Non-Specific -- Thallium Salts, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

COMMENTS

Sources searched but no information found:

NFPA 1984
Weiss 1980
CHRIS 1978
Arena 1979
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Doull 1980

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MERCURIC CHLORIDE

CAS Registry Number: 7487-94-7

Synonyms: Mercury (II) Chloride; Abavit B; Bichloride of Mercury; Calochlor; Corrosive Mercury Chloride; Corrosive Sublimate; Dichloromercury; Fungchex; MC; Mercuric Bichloride; Mercury Bichloride; Mercury Dichloride; Mercury Perchloride; NCI-C60173; Perchloride of Mercury; Sublimate; Sulem; TL 898; Mercuric Chloride, Solid (DOT); Mercury Chloride

Chemical Formula: $HgCl_2$

Molecular Weight: 271.52

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 1 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Mercury Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 576°F, 302°C (*Weast 1979)

Specific Gravity (H_2O=1): 5.44 at 25°C (*Weast 1979)

Vapor Pressure (mmHg): 1 at 136.2°C (*Sax 1979)

Melting Point: 529°F, 276°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 6.9 g/100 ml at 20°C (*Weast 1979)

Appearance and Odor: White crystals or powder (*Weast 1979); odorless (Weiss 1980, p. 581)

MERCURIC CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Mercury and inorganic compounds) Ceiling 0.1 mg/m^3, as mercury (NIOSH 1987, p. 152)

ACGIH TLV: (Mercury, Aryl and inorganic compounds) TWA 0.10 mg/m^3, as mercury (skin) (ACGIH 1986-87, p. 22)

IDLH: Not Found

Other Limits Recommended: (Mercury and inorganic compounds) NIOSH: 0.05 mg/m^3, 10-hour TWA, as mercury (NIOSH 1987, p. 152) IDLH for mercury and inorganic compounds 28 mg/m^3 (NIOSH 1987, p. 152)

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 581)
Skin: Yes (*Gosselin 1976)
Ingestion: Yes (*Browning 1969)

Health Hazards (Acute, Delayed, and Chronic): It is classified as extremely toxic. All forms of mercury are poisonous if absorbed. Probable oral lethal dose is 5-50 mg/kg; between 7 drops and 1 teaspoonful for a 150 lb. person. Mercuric chloride is one of the most toxic salts of mercury (*Gosselin 1976). Material attacks the gastrointestinal tract and renal systems (*Friberg 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Some of these materials may burn but none of them ignite readily. Extinguish with water spray, fog, foam, dry chemical or carbon dioxide (*DOT 1984).

Special Fire Fighting Procedures: Move container from fire area. Wear self-contained breathing apparatus and full body protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Material may explode on heating, with friction, or contact with alkali metals, sulfides, acetylene, ammonia, and oxalic acid (*Rumack 1975 to Present).

NFPA Flammability Rating: Not Found

MERCURIC CHLORIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 581)

Conditions to Avoid: Mercuric chloride may explode with friction or application of heat. Mixtures of mercuric chloride and sodium or potassium are shock sensitive and will explode on impact (*NFPA 1978). Avoid contact with acids or acid fumes (*Sax 1975).

Incompatibility (Materials to Avoid): Formates, sulfites, hypophosphites, phosphates, sulfides, albumin, gelatin, alkalies, alkaloid salts, ammonia, lime water, antimony, arsenic, bromides, borax, carbonates, reduced iron, copper, iron, lead, silver salts, infusions of cinchona, columbo, oak bark or senna, and tannic acid (*Merck 1983).

Hazardous Decomposition or Byproducts: Upon decomposition highly toxic chloride and mercury fumes are emitted (*Sax 1975).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Preserving wood and anatomical specimens; embalming; browning and etching steel and iron (*Merck 1983); catalyst for organic synthesis; disinfectant; antiseptic; tanning; textile printing aid; manufacture of dyes; agricultural chemicals and dry batteries; pharmaceuticals; and photographic chemicals (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

After spill keep unnecessary people away and stay upwind. If water pollution occurs, notify appropriate authorities. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

MERCURIC CHLORIDE

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for MERCURIC CHLORIDE

(7487-94-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless crystals or white powder.

Odor - None.

Commercial Forms - Crystals, granules, wettable powder or dusts in 100-pound drums.

Uses - Preserving wood and anatomical specimens; embalming; disinfectant; browning and etching steel and iron; tanning; textile printing aid; catalyst for organic synthesis; manufacture of dyes, agricultural chemicals, dry batteries, pharmaceuticals, and photographic chemicals.

Materials to Avoid - Reducing agents.

Caution: *Avoid sources of heat including fire. Mercuric chloride may liberate irritating or poisonous gases when heated to decomposition.*

Other Names - Calochlor, corrosive sublimate, dichloromercury, Fungchex, mercury bichloride, mercury perchloride, Sublimate, Sulem.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, penicillamine, dimercaprol (BAL).

MERCURIC CHLORIDE

Signs and Symptoms of Acute Mercuric Chloride Exposure:

Signs and symptoms of acute exposure to mercuric chloride may be severe and include increased salivation, foul breath, inflammation and ulceration of the mucous membranes, abdominal pain, and bloody diarrhea. Dermal exposure may result in dermatitis (red, inflamed skin) and burns. Oliguria (scanty urination), anuria (suppression of urine formation), and acute renal failure may be noted. Weak pulse, seizures, psychic disturbances, circulatory collapse, chest pain, and dyspnea (shortness of breath) may be observed.

Emergency Life-Support Procedures:

Acute exposure to mercuric chloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to mercuric chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to mercuric chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

MERCURIC CHLORIDE

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas for 15 minutes with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TITANIUM TETRACHLORIDE

CAS Registry Number: 7550-45-0

Synonyms: Tetrachlorotitanium; Titanic Chloride; Titanium Chloride, (T-4)-; Titanium Chloride

Chemical Formula: $TiCl_4$

Molecular Weight: 189.73

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.1 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 277.5°F, 136.4°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.726 (*Merck 1976)

Vapor Pressure (mmHg): 10 at 21.3°C (Encyc Occupat Health and Safety 1983, p. 2180)

Melting Point: -11.4°F, -24.1°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in cold water (*Merck 1976)

Appearance and Odor: A colorless (*Merck 1976) or light yellow (*Weast 1979) liquid with penetrating acid odor (*Merck 1976)

TITANIUM TETRACHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1979)
Skin: Yes (*Sax 1979)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): This compound is a highly corrosive, acute irritant to the skin, eyes, mucous membranes and the respiratory tract. It is capable of causing death or permanent injury due to exposures encountered in normal use (*Sax 1979). Even short contact may lead to eye inflammation which may result in corneal opacities (Encyc Occupat Health and Safety 1983, p. 2180).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not flammable (Weiss 1980, p. 869). For small fires, use dry chemical or carbon dioxide. For large fires, flood fire area with water from a distance. Do not get solid streams of water on spilled material. Move container from fire area if this can be done without risk. Cool containers exposed to flames with water until well after fire is out (*DOT 1984).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Material will react with water to produce hydrochloric acid (*Thienes 1972). It may ignite other combustible materials (e.g., wood, oil, etc.). Flammable, poisonous gases may accumulate in tanks and hopper cars. Runoff to sewer may create fire or explosion hazard (*DOT 1984).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 869); in concentrated aqueous solutions (*Hawley 1977)

TITANIUM TETRACHLORIDE

SECTION V (continued)

Conditions to Avoid: Avoid contact with moisture; the chemical absorbs moisture from air and evolves dense white fumes (Merck 1983, p. 1357).

Incompatibility (Materials to Avoid): Water, moist air (Weiss 1980, p. 869)

Hazardous Decomposition or Byproducts: Reacts strongly with water to release hydrochloric acid and heat (*Thienes 1972).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacture of titanium salts, mordant dye, and titanium pigments (*Hawley 1977), and used as a chemical intermediate for titanium metal, titanium dioxide, as an agent in smoke screens, polymerization catalyst, and iridescent agent in glass and pearl manufacturing (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate closed spaces before entering (*DOT 1984). In case of emergency, keep unnecessary people away and isolate hazard area. Stay upwind and keep out of low areas. Workers should receive periodic medical exams at least annually and those manifesting signs of persistent injury to upper respiratory tract should be transferred to other work (*Encyc Occupat Health and Safety 1971).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED*
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

TITANIUM TETRACHLORIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inhalation symptoms include congestion and irritation of upper respiratory tract (*Browning 1969), coughing, burning of the throat, headache and weakness. Prolonged exposure to low concentrations may cause cough and pneumonia (*Rumack 1975 to Present). Ingestion causes mouth, throat and GI tract irritation, nausea, vomiting, cramps and diarrhea (Weiss 1980, p. 869). Corneal damage has been observed in individuals exposed to fumes (*Grant 1974).

Emergency and First Aid Procedures: Move victim to fresh air and call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. Speed in removing material from skin is of extreme importance. In case of contact, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (*DOT 1984). If skin is exposed, however, wipe off with dry cloth before applying water (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- LITHIUM HYDRIDE

CAS Registry Number: 7580-67-8

Synonyms: Lithium Monohydride; Lithium Hydride (LiH)

Chemical Formula: LiH

Molecular Weight: 7.95

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rat) 0.022 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 0.76-0.77 (*Merck 1983)

Vapor Pressure (mmHg): 0 at 20°C (*NIOSH/OSHA 1981)

Melting Point: 1256°F, 680°C (*Merck 1983) 1267°F, 686°C (*NIOSH/OSHA 1978)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (Merck 1983, p. 793)

Appearance and Odor: Pure lithium hydride is a white or translucent crystalline mass or powder (*Hawley 1981). However, the commercial product is usually gray (*Merck 1983). Lithium hydride is odorless (*CHRIS 1978).

LITHIUM HYDRIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.025 mg/m^3 (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.025 mg/m^3 (*ACGIH 1984)

IDLH: 55 mg/m^3 (NIOSH 1987, p. 148)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*Grant 1974; *Clayton and Clayton 1981-82)

Health Hazards (Acute, Delayed, and Chronic): This material is relatively toxic to people. It is more likely to cause irritation of skin and mucous membrane tissues rather than death. Its effects are primarily acute. A massive exposure to the eyes and by inhalation may be lethal (*DOT 1984; *Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Those experiencing any ailment of the upper respiratory tract (e.g., bronchitis or pneumonia) are at a greater risk (*Rumack 1975 to Present).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Flammable solid (*NIOSH/RTECS 1985)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Do not use water, carbon dioxide, dry chemical, or halogenated extinguishing agents such as carbon tetrachloride (*NFPA 1978). Use dry graphite; or ground dolomite-based dry chemical extinguishers such as "Lith-X" (*NFPA 1978, *Clayton and Clayton 1981-2). Fires may be smothered by inverting a can over them (*NFPA 1984).

Special Fire Fighting Procedures: Wear protective goggles or face shield, rubberized gloves, flame-proof outer clothing, respirator, and high boots or shoes (*CHRIS 1978). Large fires: withdraw from area and let fire burn, as lithium hydride may continue to re-ignite (*DOT 1984). A fire, once started, cannot be extinguished by ordinary methods (*Clayton and Clayton 1981-82).

Unusual Fire and Explosion Hazards: In a fire, irritating alkali fumes may form (*CHRIS 1978). Lithium hydride can form airborne dust clouds which may explode on contact with flame, heat, or oxidizing materials (*NFPA 1978). Additionally, spontaneous ignition occurs when nitrous oxide and lithium hydride are mixed. Lithium hydride also forms explosive mixtures with liquid oxygen (*NFPA 1978).

NFPA Flammability Rating: 4

LITHIUM HYDRIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (NFPA 1984, p. 49-59)
Stable:

Conditions to Avoid: Lithium hydride may ignite spontaneously in air and should be maintained and handled out of contact with air and moisture (*Clayton and Clayton 1981-82). Any contact with nitrous oxide; airborne powders may ignite upon reaching moisture (*NFPA 1978).

Incompatibility (Materials to Avoid): Incompatible with air and moisture (*Clayton and Clayton 1981-82), nitrous oxide, strong oxidizers, and liquid oxygen (*NFPA 1978).

Hazardous Decomposition or Byproducts: Contact with heat, moisture or acid causes exothermic reaction and evolution of hydrogen as well as lithium hydroxide (*Clayton and Clayton 1981-82).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Lithium hydride is a reducing agent used for condensing ketones and acetic esters. Used as a desiccant in hydrogen generators (*Merck 1983). Preparation of double hydrides used in nuclear shielding materials (*Hawley 1981). Used in the manufacture of electronic tubes, ceramics, and chemical synthesis (*Doull 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Isolate hazard area and deny entry. Stay upwind; keep out of low areas. In the event of a spill or leak, shut off ignition sources; no flares, smoking or other sources of flame. Do not touch spilled materials. Do not allow material to contact water. Shovel up small spills with noncombustible absorbent material. Confine large spills with dikes, sheets, or tarps to stop spreading (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

LITHIUM HYDRIDE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Butyl/Neoprene	GOOD/LIMITED**
CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
Viton	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for LITHIUM HYDRIDE

(7580-67-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - White, translucent, crystalline mass or powder (darkens on exposure to light).

Odor - None.

Commercial Forms - 93 to 95% pure light bluish-gray crystalline mass or a white or gray powder contained in cans, cases, or drums.

Uses - Desiccant, chemical syntheses, reducing agent, hydrogen generators, nuclear shielding materials, manufacture of electronic tubes and ceramics.

Materials to Avoid - Oxidizers, oxygen, and water (except for use in emergency life support).

Caution: *Explosion potential is high. Avoid any sources of extreme heat or ignition including sparks or fire. Lithium hydride may spontaneously ignite on contact with water or moist surfaces.*

Other Names - Lithium monohydride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May be Required:

Compressed oxygen, forced-oxygen mask, water, milk, normal saline, D5W, Ringer's lactate.

LITHIUM HYDRIDE

Signs and Symptoms of Acute Lithium Hydride Exposure:

Warning: Lithium hydride is an alkaline-corrosive agent. Contact with eyes may result in severe damage to the cornea, conjunctiva, and blood vessels. Caution is advised.

Acute exposure to lithium hydride may result in irritation and burning of the skin, eyes, and mucous membranes. Increased salivation, dysphagia (difficulty swallowing), abdominal pain, and spontaneous vomiting may occur. Stridor (high-pitched, noisy respirations), dyspnea (shortness of breath), and pulmonary edema are also common. Apathy and mental confusion may develop, with progression to coma and death.

Emergency Life Support Procedures:

Acute exposure to lithium hydride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to lithium hydride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to lithium hydride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

LITHIUM HYDRIDE

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 30 minutes.

5. Wash exposed skin areas for at least 15 minutes with water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM ARSENATE

CAS Registry Number: 7631-89-2

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 439): Arsenic Acid, Sodium Salt; Fatsco Ant Poison; Sodium Arsenate (DOT); Sodium Orthoarsenate; Sweeney's Ant-Go

Chemical Formula: $AsH_3O_4 \cdot xNa$

Molecular Weight:

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rabbit) 12.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 1000 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

SODIUM ARSENATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987 p. 54)

ACGIH TLV: (Arsenic and soluble compounds) TWA 0.2 mg/m^3, as arsenic (ACGIH 1986-87, p. 10)

IDLH: Not Found

Other Limits Recommended: NIOSH: 0.002 mg/m^3, 15-minute ceiling (NIOSH 1987, p. 54); NIOSH occupational carcinogen (NIOSH 1987, p. 54)

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 319)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Arsenic) High mortality rate due to acute poisoning usually within 48 hours (Gosselin 1984, p. III-42).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do it without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. If water pollution occurs, notify appropriate authorities (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of arsenic (Sax 1984, p. 319).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

SODIUM ARSENATE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of arsenic (Sax 1984, p. 319).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide (Farm Chemicals Handbook 1984, p. C-207).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb with sand or other non-combustible 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SODIUM ARSENATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Arsenic) Death can occur due to a severe decrease in blood pressure. Thickening of skin on palms and soles following chronic low-level exposures. Symptoms usually appear one-half to one hour after ingestion but may be delayed many hours. These symptoms include: a feeling of constriction of throat, difficulty swallowing, abdominal discomfort with pain, vomiting, watery diarrhea, sweetish metallic taste, garlicky odor of breath and stools, and dizziness with frontal headaches (Hayes 1982, p. 41; Gosselin 1984, p. III-42).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

COMMENTS

Sources searched but no information found:

Weast 1979
Merck 1983
NIOSH/OSHA 1978
ACGIH 1984
Weiss 1980
Hawley 1981
Student 1981
DASE 1980
Clayton and Clayton 1981-82
Encyc Occupat Health and Safety 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BORON TRIFLUORIDE

CAS Registry Number: 7637-07-2

Synonyms: ANCA 1040; Borane, Trifluoro-; Boron Fluoride; Boron Fluoride (BF3); Trifluoroboron

Chemical Formula: BF_3

Molecular Weight: 67.82

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (guinea pig) 0.109 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -148°F, -99.9°C (*Weast 1979); -148.7°F, -100.4°C (Merck 1983, p. 187)

Specific Gravity (H_2O=1): Liquid: 1.6 (DASE 1980, p. 216)

Vapor Pressure (mmHg): Liquid: 760 at -100.7°C (Perry 1984, p. 3-47)

Melting Point: -196.1°F, -126.7°C (*Weast 1979)

Vapor Density (AIR=1): 2.4 (DASE 1980, p. 216)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 332 g/100 ml at 0°C (*Merck 1983); 106 g/100 ml (Weast 1979, p. B-102); some hydrolysis occurs (Merck 1983, p. 187)

BORON TRIFLUORIDE

SECTION II (continued)

Appearance and Odor: Colorless gas with a pungent, suffocating odor (*Merck 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 1 ppm (3 mg/m^3) (NIOSH/OSHA 1978, p. 50)

ACGIH TLV: Ceiling 1 ppm (3 mg/m^3) (ACGIH 1983, p. 12)

IDLH: 100 ppm (NIOSH/OSHA 1978, p. 50)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 148)
Skin: Yes (DASE 1980, p. 216)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Highly toxic; may cause death or permanent injury after very short exposure to small quantities (*Sax 1975). Substance is irritating to the eyes, the skin, and the respiratory tract (DASE 1980, p. 216).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not Flammable (NIOSH/OSHA 1978, p. 50)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 15).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and full protective clothing. Evacuate area endangered by gas. Do not get water inside container. Move container from fire area if you can do it without risk. Stay away from ends of tanks. Cool containers that are exposed to flames with water from the side until well after fire is out. Isolate area until gas has dispersed (DOT 1984, Guide 15).

Unusual Fire and Explosion Hazards: When heated to decomposition or upon contact with water or steam, it will product toxic and corrosive fumes of fluorine containing compounds (Sax 1984 p. 513). Decomposes upon heating or on contact with moist air, forming toxic and corrosive fumes of boric acid and hydrofluoric acid (DASE 1980, p. 216).

NFPA Flammability Rating: 0

BORON TRIFLUORIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*ACGIH 1980)
Stable:

Conditions to Avoid: It hydrolyzes in moist air to form boric acid, hydrofluoric acid, and fluoboric acid (*ACGIH 1980).

Incompatibility (Materials to Avoid): Reacts with alkalis and fumes in moist air, producing particulates which reduce visibility (NIOSH/OSHA 1978, p. 50). Reacts with alkali metals, alkaline earth metals (except magnesium), alkyl nitrates, and calcium oxide (Sax 1984, p. 513).

Hazardous Decomposition or Byproducts: When heated to decomposition, it will produce toxic and corrosive fumes of fluorine containing compounds (Sax 1984, p. 513).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Catalyst in organic synthesis; production of diborane; instruments for measuring neutron intensity; soldering fluxes; gas brazing (Hawley 1981, p. 146); protects molten magnesium and its alloys from oxidation; and a fumigant (Merck 1983, p. 187). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Stop leak if you can do it without risk. Use water spray to reduce vapor but do not put water on leak or spill area. Small spills: flush area with flooding amounts of water. Large spills: dike far ahead of spill for later disposal. Do not get water inside container. Isolate area until gas has dispersed (DOT 1984, Guide 15).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

BORON TRIFLUORIDE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for BORON TRIFLUORIDE

(7637-07-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless gas.

Odor - Pungent, suffocating.

Commercial Form - Gas shipped in pressure cylinders or tank vehicles.

Uses - Catalyst in organic synthesis, manufacture of boranes, soldering flux, gas brazing, oxidation protectant, fumigant, polymerizer of epoxy resins, casting and heat treating in magnesium industry.

Materials to Avoid - Oxygen, water (except for use in emergency life support).

Caution: *Avoid sources of heat including fire. Boron trifluoride will liberate toxic and corrosive fumes when heated to decomposition and will generate hydrofluoric, fluoboric, and boric acids upon contac' with water.*

Other Names - ANCA 1040, trifluoroborane, trifluoroboron.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate.

BORON TRIFLUORIDE

Signs and Symptoms of Acute Boron Trifluoride Exposure:

Warning: *Boron trifluoride is extremely corrosive. Caution is advised.*

Acute inhalation exposure of boron trifluoride may result in sneezing, hoarseness, choking, laryngitis, and respiratory tract irritation. Bleeding of the nose and gums, ulceration of the nasal and oral mucosa, bronchitis, pneumonia, dyspnea (shortness of breath), chest pain, and pulmonary edema may also occur.

If the eyes have come in contact with boron trifluoride, irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure may result in dermatitis (red, inflamed skin), severe burns, and pain.

Emergency Life-Support Procedures:

Acute exposure to boron trifluoride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to boron trifluoride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to boron trifluoride.

BORON TRIFLUORIDE

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. Humidified oxygen is preferred.

2. IMMEDIATELY give the victims milk or water to dilute the hydrofluoric acid: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Milk or water should be given only if victims are conscious and alert.

3. DO NOT induce vomiting.

4. Milk of Magnesia should be administered if victims are conscious and alert. Use 2.5 mL (1/2 tsp) for children up to 1 year old, 5 mL (1 tsp) for children 1 to 12 years old, and 10 mL (2 tsp) for adults. Do not exceed 15 mL (3 tsp or 1 tbsp).

5. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

6. Activated charcoal is of no value.

7. Repeat the administration of water or milk to conscious and alert victims. Use quantities listed above (see No. 2).

8. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDROGEN CHLORIDE (gas only)

CAS Registry Number: 7647-01-0

Synonyms: Anhydrous Hydrochloric Acid; Chlorohydric Acid; Hydrochloric Acid Gas; Hydrochloric Acid, Trimer; Hydrochloride; Hydrogen Chloride Dimer; Muriatic Acid; Spirits of Salt

Chemical Formula: HCl

Molecular Weight: 36.46

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: Constant boiling azeotrope with water 227°F, 109°C containing 20.22% hydrogen chloride (Merck 1983, p. 692); -121°F, -85°C (gas) (*Weast 1979)

Specific Gravity (H_2O=1): 1.05 at 15°C/4°C for 10.17% weight/weight solution (Merck 1983, p. 692)

Vapor Pressure (mmHg): Not Found

Melting Point: Freezing point -13.7°F, -25.4°C (39.17% weight/weight solution) (Merck 1983, p. 692); -174.6°F, -114.8°C (gas) (*Weast 1979)

Vapor Density (AIR=1): 1.268 (*Merck 1983)

HYDROGEN CHLORIDE (gas only)

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 82.3 g/100 mL at 32°F (gas) (*Weast 1979)

Appearance and Odor: Colorless gas or liquid (*Weast 1979). Irritating pungent odor (*NFPA 1978). May be colored yellow by traces of iron, chlorine, and organic matter (*Merck 1983).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 5 ppm (7 mg/m^3) (NIOSH/OSHA 1978, p. 110)

ACGIH TLV: Ceiling 5 ppm (7 mg/m^3) (ACGIH 1986-87, p. 20)

IDLH: 100 ppm (NIOSH/OSHA 1978, p. 110)

Other Limits Recommended: EEGL 20.0 ppm (60 minutes) (NRC 1987, pp. 17-30). SPEGL 1.0 ppm (60 minutes) (NRC 1987, pp. 17-30).

Routes of Entry: **Inhalation:** Yes (*Merck 1983)
Skin: Yes (*Merck 1983)
Ingestion: Yes (*Merck 1983)

Health Hazards (Acute, Delayed, and Chronic): Gas concentrations of 50 to 100 ppm are tolerable for 1 hour. Concentrations of 1,000 to 2,000 ppm are dangerous, even for brief exposures. More severe exposures will result in serious respiratory distress and prolonged exposures will result in death. Mists of hydrochloric acid are considered less harmful than anhydrous hydrochloric acid, because droplets have no dehydrating action (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Individuals with respiratory problems and digestive diseases may be adversely affected by low level exposures to the gas or mist (*Encyc Occupat Health and Safety 1983).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not combustible (*NFPA 1978)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Normal fire fighting procedures may be used (*NFPA 1978). Do not get water inside containers. Move containers from fire area. Keep containers that are exposed to the fire cool with water that is sprayed from the side until well after the fire is out (*DOT 1984).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and full protective clothing (*DOT 1984). Neutralize with chemically basic substances such as soda ash or slaked lime (*NFPA 1978).

HYDROGEN CHLORIDE (gas only)

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases. Containers may explode in heat of fire (*DOT 1984).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 513)

Conditions to Avoid: Avoid heat; at high temperatures it will decompose into hydrogen and chlorine (*Encyc Occupat Health and Safety 1983).

Incompatibility (Materials to Avoid): Mercuric sulfate -- violent reaction with gaseous hydrochloric acid at 250F. Sodium -- reacts vigorously with gaseous hydrochloric acid. Acetic anhydride, 2-aminoethanol, ammonium hydroxide, chlorosulfonic acid, ethylene diamine, ethyleneimine, oleum, propiolactone, sodium hydroxide, sulfuric acid, and vinyl acetate -- increase in temperature and pressure when mixed with hydrochloric acid. Calcium phosphide -- energetic reaction with hydrochloric acid. Silver perchlorate and carbon tetrachloride -- when mixed in combination with hydrochloric acid forms a compound that detonates at 105F (*NFPA 1978). Formaldehyde -- when mixed with hydrochloric acid forms a human carcinogen (*NRC 1981).

Material reacts violently with bases and is corrosive with the generation of heat. Reacts with base metals, forming combustible gas (hydrogen). Reacts violently with strong oxidants forming toxic gas (chlorine) (DASE 1980, p. 541).

Hazardous Decomposition or Byproducts: At high temperatures, it decomposes into hydrogen and chlorine (*Encyc Occupat Health and Safety 1983).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Major uses of hydrochloric acid include refining metal ore, lab reagent, and removing scale from boilers (*Merck 1983). It is also a metal treating agent; it is used in food processing, and to neutralize waste streams (*Hawley 1981). It is used in the manufacture of fertilizers and dyes, in electroplating, in the textile industry, and in the rubber industry (*Encyc Occupat Safety and Health 1983).

HYDROGEN CHLORIDE (gas only)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away and stay upwind. Stay out of low areas. Ventilate closed areas before entering them. Use water spray to reduce vapor from leak. For small spills, flush area with flooding amounts of water. For larger spills, dike far ahead of spill for later disposal. Do not get water inside containers (*DOT 1984). Spilled material can be neutralized with powdered limestone, slaked lime, soda ash, or sodium bicarbonate (*CHRIS 1978).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Butyl/Neoprene	GOOD/LIMITED
CPE	GOOD/LIMITED
Chlorobutyl	GOOD/LIMITED
Neoprene	EXCELLENT/MANY
Nitrile	GOOD/LIMITED
PVC	POOR/MANY
Saranex	GOOD/LIMITED
Teflon	POOR/LIMITED
Viton	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

NOTES: Based on 100% HCl liquid

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for HYDROGEN CHLORIDE

(7647-01-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless gas; colorless to slightly yellow water solution.

Odor - Pungent, suffocating.

Commercial Forms - Gas in pressurized containers; aqueous liquid in glass bottles, carboys, rubber-lined steel drums, rubber-lined tank cars.

Uses - Laboratory reagent, activator of petroleum wells, metal ore refining, boiler scale removal agent, metal treating, food processing, waste stream neutralizer, electroplating, fertilizers.

Other Names - Clorohydric acid, hydrochloric acid, muriatic acid.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Hydrogen Chloride Exposure:

Warning: *Hydrogen chloride is extremely corrosive. Caution is advised.*

Signs and symptoms of acute ingestion of hydrogen chloride may be severe and include salivation, intense thirst, difficulty in swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of hydrogen chloride.

HYDROGEN CHLORIDE

Acute inhalation exposure of hydrogen chloride may result in sneezing, hoarseness, choking, laryngitis, and respiratory tract irritation. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, bronchitis, pneumonia, dyspnea (shortness of breath), chest pain, and pulmonary edema may also occur.

If the eyes have come in contact with hydrogen chloride, irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure may result in dermatitis (red, inflamed skin), severe burns, and pain.

Emergency Life-Support Procedures:

Acute exposure to hydrogen chloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrogen chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydrogen chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

HYDROGEN CHLORIDE

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Rinse mouth with large amounts of water. Victims should not attempt to swallow this water.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDROGEN FLUORIDE

CAS Registry Number: 7664-39-3

Synonyms: Hydrofluoric Acid; Anhydrous Hydrofluoric Acid; Antisal 2B; Fluorhydric Acid; Hydrofluoric Acid Gas; Hydrofluoric Acid, Anhydrous (DOT)

Chemical Formula: HF

Molecular Weight: 20.01

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.28 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 67.1°F, 19.51°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.991 at 19.5°C (Weast 1983, p. B-97)

Vapor Pressure (mmHg): 400 at 2.5°C (*Sax 1975)

Melting Point: -118.4°F, -83.55°C (*Merck 1976)

Vapor Density (AIR=1): 0.7 (Weiss 1980, p. 515)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble (*Merck 1976)

Appearance and Odor: Colorless, fuming liquid or gas with a strong, irritating odor (NIOSH/OSHA 1978, p. 112).

HYDROGEN FLUORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 3 ppm (NIOSH/OSHA 1978, p. 112)

ACGIH TLV: Ceiling TWA 3 ppm (2.5 mg/m^3); STEL 6 ppm (ACGIH 1987, p.21)

IDLH: 30 ppm (NIOSH 1987, p. 138)

Other Limits Recommended: NIOSH: 3 ppm 10-hour TWA, 6ppm 15-minute ceiling (NIOSH 1987, p. 138)

Routes of Entry: **Inhalation:** Yes (*NRC 1981)
Skin: Yes (*Clayton and Clayton 1981-82)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Ingestion of an estimated 1.5 grams produced sudden death without gross pathological damage. Repeated ingestion of small amounts resulted in moderately advanced hardening of the bones (*Gosselin 1976). Contact of skin with anhydrous liquid produces severe burns (*Clayton and Clayton 1981-82). Inhalation of anhydrous hydrogen fluoride or hydrogen fluoride mist or vapors can cause severe respiratory tract irritation that may be fatal (*NRC 1981).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Flammable (Weiss 1980, p. 515)
Flammable Limits:
LEL: Non-Flammable (*Encyc Occupat Health and Safety 1976)
UEL: Non-Flammable (*Encyc Occupat Health and Safety 1976)

Extinguishing Methods: Use water on fires in which hydrofluoric acid is involved (*NFPA 1978).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated, it emits highly corrosive fumes of fluorides (*Sax 1975). Its corrosive action on metals can result in formation of hydrogen in containers and piping to create fire hazard (*Encyc Occupat Health and Safety 1971).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 515)

Conditions to Avoid: May generate flammable hydrogen gas in contact with some metals (Weiss 1980, p. 515)

HYDROGEN FLUORIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Will attack glass, concrete, and certain metals, especially those containing silica, such as cast iron. Will attack natural rubber, leather, and many organic materials (Weiss 1980, p. 515).

Hazardous Decomposition or Byproducts: Toxic and irritating vapors are generated when heated (Weiss 1980, p. 515).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Removing efflorescence from brick and stone, or sand particles from metallic castings; working over too heavily weighted silks; cleaning cast iron, copper, brass; polishing crystal glass; decomposition of cellulose; enameling and galvanizing iron; increasing porosity of ceramics; in fluorination processes, especially in the aluminum industry; manufacture of fluorides; separating uranium isotopes; in making fluoride containing plastics; in dye chemistry (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill or leak to disperse gas. If in gaseous form, stop flow of gas. If source of leak is cylinder and leak cannot be stopped, remove to safe place in open air and repair leak or allow cylinder to empty. If in liquid form, allow to vaporize and disperse the gas (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Butyl/Neoprene	POOR/LIMITED
CPE	GOOD/LIMITED*
Neoprene	POOR/LIMITED*
Nitrile	POOR/LIMITED*
PE	GOOD/LIMITED

HYDROGEN FLUORIDE

SECTION VIII (continued)

PVC	POOR/MANY
Saranex	GOOD/LIMITED
Viton	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

NOTES: Based on 100% HF liquid

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for HYDROGEN FLUORIDE

(7664-39-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless gas.

Odor - Strongly irritating.

Commercial Forms - 99.9% pure gas in cylinders or tank cars; 48, 52, and 70% pure aqueous solutions.

Uses - Specialty chemical manufacture; metal, brick, and sand cleaning; iron galvanizing; silk working; crystal or glass polishing; increasing ceramic porosity; separating uranium isotopes; cellulose decomposition; dye chemistry; petrochemical refining.

Materials to Avoid - Water (except for use in emergency life support).

Other Nam s - Anhydrous hydrofluoric acid, fluorohydric acid gas, hydrofluoric acid.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, milk of Magnesia, normal saline, D5W, Ringer's lactate, calcium gluconate.

HYDROGEN FLUORIDE

Signs and Symptoms of Acute Hydrogen Fluoride Exposure:

Warning: *Hydrogen fluoride is highly corrosive. Effects may be delayed from 1 to 24 hours. Caution is advised.*

Acute exposure to hydrogen fluoride will result in irritation, burns, ulcerous lesions, and necrosis of the eyes, skin, and mucous membranes. Total destruction of the eyes is possible. Other effects include nausea, vomiting, diarrhea, pneumonitis (inflammation of the lungs), and circulatory collapse.

Emergency Life-Support Procedures:

Acute exposure to hydrogen fluoride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as hydrogen fluoride-resistant plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrogen fluoride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. Humidified oxygen is preferred.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydrogen fluoride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. Humidified oxygen is preferred.

3. Remove contaminated clothing as soon as possible.

HYDROGEN FLUORIDE

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. Humidified oxygen is preferred.

2. IMMEDIATELY give the victims milk or water to dilute the hydrofluoric acid: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Milk or water should be given only if victims are conscious and alert.

3. DO NOT induce vomiting.

4. Milk of Magnesia should be administered if victims are conscious and alert. Use 2.5 mL (1/2 tsp) for children up to 1 year old, 5 mL (1 tsp) for children 1 to 12 years old, and 10 mL (2 tsp) for adults. Do not exceed 15 mL (3 tsp or 1 tbsp).

5. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

6. Activated charcoal is of no value.

7. Repeat the administration of water or milk to conscious and alert victims. Use quantities listed above (see No. 2).

8. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- AMMONIA

CAS Registry Number: 7664-41-7

Synonyms: AM-FOL; Ammonia Gas; Ammonia, Anhydrous; Nitro-Sil; R 717; Spirit of Hartshorn; Liquid Ammonia

Chemical Formula: H_3N

Molecular Weight: 17.03

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -28.03°F, -33.35°C (*Merck 1976)

Specific Gravity (H_2O=1): Liquid 0.6818 at -33.35°C (Merck 1983, p. 74)

Vapor Pressure (mmHg): 400 at -45.4°C (*Weast 1983)

Melting Point: -107.9°F, -77.7°C (*Merck 1976)

Vapor Density (AIR=1): 0.6 (Weiss 1980, p. 73)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 31 g/100 g at 25°C (*Merck 1983)

Appearance and Odor: Colorless gas, liquid (*Weast 1979); sharp, cloying, repellant odor (*Booth 1982)

AMMONIA

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 50 ppm (35 mg/m^3) (NIOSH 1987, p. 50)

ACGIH TLV: TWA 25 ppm (18 mg/m^3); STEL 35 ppm (27 mg/m^3) (*ACGIH 1983)

IDLH: 500 ppm (NIOSH/OSHA 1978, p. 44)

Other Limits Recommended: Short-term inhalation limits: 50 ppm for 5 minutes (*CHRIS 1978). NIOSH: 50 ppm (35 mg/m^3) 5-minute ceiling (NIOSH 1987, p. 50). EEGL 100.0 ppm (60 minutes) (NRC 1987, pp. 7-16).

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 73)
Skin: Yes (Weiss 1980, p. 73)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Vapors cause irritation of eyes and respiratory tract (*Gosselin 1976). Liquid will burn skin and eyes (*CHRIS 1978). Poisonous; may be fatal if inhaled. Contact may cause burns to skin and eyes. Contact with liquid may cause frostbite (DOT 1984, Guide 15).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: 16% (*NFPA 1978)
UEL: 25% (*NFPA 1978)

Extinguishing Methods: Small fires: dry chemical or carbon dioxide. Large fires: water spray, fog or foam. Apply water gently to the surface. Do not get water inside container. Move container from fire area if you can do it without risk. Stay away from ends of tanks. Cool containers that are exposed to flames with water from the side until well after fire is out. Isolate area until gas has dispersed (DOT 1984, Guide 15).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and full protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Mixing of ammonia with several chemicals can cause severe fire hazards and/or explosions (*Bretherick 1979; *NFPA 1978; *Merck 1983). Ammonia in container may explode in heat of fire (*DOT 1984).

NFPA Flammability Rating: 1

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 73)

AMMONIA

SECTION V (continued)

Conditions to Avoid: Mixing with other chemicals and water (*Bretherick 1979).

Incompatibility (Materials to Avoid): Incompatible with many materials including silver and gold salts, halogens, alkali metals, nitrogen trichloride, potassium chlorate, chromyl chloride, oxygen halides, acid vapors, azides, ethylene oxide (*Bretherick 1979), picric acid (*Environment Canada 1981), and many other chemicals (*NFPA 1978).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 73)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Twenty-five percent used as a direct application fertilizer; intermediate uses include 10% used to make urea fertilizer; 19% for ammonium nitrate fertilizer; 18% for all other fertilizers; 4% for ammonium nitrate-based commercial explosives; 7% for major fiber and plastic intermediates, and 14% for all other applications (*SRI). Also used as a bactericide (USEPA/ Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill or leak to disperse gas. If in gaseous form stop flow of gas. If source of leak is a cylinder and leak cannot be stopped in place, remove leaking cylinder to safe place in open air and repair leak or allow cylinder to empty. If in liquid form allow to vaporize (*NIOSH/OSHA 1981). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Evacuate area endangered by gas (DOT 1984, Guide 15).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

AMMONIA

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED*
Neoprene	GOOD/LIMITED*
PVC	GOOD/LIMITED*
Viton	POOR/LIMITED*
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for AMMONIA

(7664-41-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless gas.

Odor - Sharp, repelling.

Commercial Form - Compressed liquefied gas in steel cylinders, pressurized tank cars, barges, pipelines.

Uses - Fertilizer, chemical intermediate, condensation catalyst, latex preservative, bactericide, refrigerant, rocket fuel component, nitriding of steel, explosives intermediate.

Caution: *Ammonia in containers may explode in heat of fire. Water used to dilute large ammonia spills must be added cautiously to avoid violent fuming.*

Other Names - Anhydrous ammonia, liquid ammonia, ammonium hydroxide (ammonia in water, CAS No. 1336-21-6).

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

AMMONIA

Signs and Symptoms of Acute Ammonia Exposure:

Warning: *Ammonia is extremely corrosive to the skin, eyes, and mucous membranes. Contact with the liquified gas may cause frostbite. Caution is advised.*

Inhalation of ammonia may cause irritation and burns of the respiratory tract, laryngitis, dyspnea (shortness of breath), stridor (high-pitched respirations), and chest pain. Pulmonary edema and pneumonia may also result from inhalation. A pink frothy sputum, convulsions, and coma are often seen following exposure to high concentrations. When ammonia is ingested, nausea and vomiting may result; oral, esophageal, and stomach burns are common.

If ammonia has contacted the eyes, irritation, pain, conjunctivitis (red, inflamed eyes), lacrimation (tearing), and corneal erosion may occur. Loss of vision is possible. Dermal exposure may result in severe burns and pain.

Emergency Life-Support Procedures:

Acute exposure to ammonia may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to ammonia.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to ammonia.

AMMONIA

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

   Warning: *Do not attempt to neutralize with an acid wash; excessive liberation of heat may result.*

3. If eye exposure has occurred, eyes must IMMEDIATELY be flushed with lukewarm water for at least 15 minutes.

4. Remove contaminated clothing as soon as possible.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal does not strongly bind ammonia, and therefore is of little or no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SULFURIC ACID

CAS Registry Number: 7664-93-9

Synonyms: Battery Acid; BOV; Chamber Acid; Dipping Acid; Fertilizer Acid; Nordhausen Acid; Oil of Vitriol; Spirit of Sulfur; Sulphuric Acid; Vitriol Brown Oil; Hydrogen Sulfate; Matting Acid; Spent Sulfuric Acid

Chemical Formula: H_2SO_4

Molecular Weight: 98.08 (*Merck 1983)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (guinea pig) 0.018 mg/L (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 554°F, 290°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.841 (*Weast 1984)

Vapor Pressure (mmHg): 1 at 146°C (*Patty 1963)

Melting Point: 50.65°F, 10.36°C (*Weast 1984)

Vapor Density (AIR=1): 3.4 (*NIOSH/OSHA 1981)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Encyc Occupat Health and Safety 1983)

Appearance and Odor: Clear, colorless, oily liquid when pure; brownish when impure (*Encyc Occupat Health and Safety 1983). Spent sulfuric acid is a black oily liquid (*Student 1981); odorless (*Merck 1983); choking odor when hot (*CHRIS 1978).

SULFURIC ACID

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 1 mg/m^3 (*NIOSH/OSHA 1978)

ACGIH TLV: TWA 1 mg/m^3 (*ACGIH 1983)

IDLH: 80 mg/m^3 (*NIOSH/OSHA 1978)

Other Limits Recommended: NIOSH: 1 mg/m^3 10-hour TWA (NIOSH 1987, p. 212). EEGL 1 mg/m^3 (60 minutes) (NRC 1984a, pp. 107-112).

Routes of Entry: **Inhalation:** Yes (*Merck 1983)
Skin: Yes (*Merck 1983)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): Corrosive to all body tissues. Inhalation of vapor may cause serious lung damage. Contact with eyes may result in total loss of vision. Skin contact may produce severe necrosis (*Merck 1983). Fatal amount for adult: between 1 teaspoonful and one-half ounce of the concentrated chemical. Even a few drops may be fatal if the acid gains access to the trachea (*Arena 1974). Chronic exposure may cause tracheobronchitis, stomatitis, conjunctivitis, and gastritis (*ACGIH 1980). Gastric perforation and peritonitis may occur and may be followed by circulatory collapse. Circulatory shock is often the immediate cause of death (*Gosselin 1984).

Medical Conditions Generally Aggravated by Exposure: Those with chronic respiratory, gastrointestinal, or nervous diseases and any eye and skin diseases are at greater risk (*Encyc Occupat Health and Safety 1983).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not flammable (Weiss 1980, p. 842). For small fires use dry chemical or carbon dioxide. Use water on combustibles burning in vicinity of this material (*NFPA 1978). For large fires flood fire area with water from a distance. Do not get solid streams of water on material. Move container from area if you can do so without risk (*DOT 1984).

Special Fire Fighting Procedures: Fight fire from safe distance or from protected location. Use care as water applied directly to this acid results in evolution of heat and causes spattering (*NFPA 1978). Cool containers that are exposed to flames with streams of water until fire is out. Wear positive pressure breathing apparatus and special protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: It is highly reactive and capable of igniting finely-divided combustible materials on contact (*NFPA 1978). When heated, it emits highly toxic fumes (*Sax 1975).

SULFURIC ACID

SECTION IV (continued)

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 842)

Conditions to Avoid: Can undergo violent chemical change at elevated temperatures and pressure. May react violently with water (*NFPA 1978). When heated, it emits highly toxic fumes (*Sax 1975).

Incompatibility (Materials to Avoid): Avoid heat; water (*NFPA 1978); and organic materials (*Encyc Occupat Health and Safety 1983). Sulfuric acid is explosive or incompatible with an enormous array of substances (*NFPA 1978; *Bretherick 1979; *Sax 1975; *ITI 1982).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 842)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacture of dyestuffs; acids; parchment paper; glue; petroleum purification (*Merck 1983); electroplating baths; non-ferrous metallurgy; production of pigments, rayon, film, laboratory reagents, etchant (*Hawley 1981), and herbicides (*Spencer 1982); dehydrating agent for ethers, esters, and gases; refining mineral and vegetable oils; leather industry (*Encyc Occupat Health and Safety 1983); chemical intermediate for fertilizers; agent in production of alcohols and explosives; iron and steel pickling; and storage batteries (*ACGIH 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Extremely hazardous to health; areas may be entered with extreme care. No skin surface should be exposed (*NFPA 1978). Keep all sources of ignition away from containers because explosive mixtures of hydrogen may be produced during storage. Small spills: cover area with sodium bicarbonate or soda ash/slaked lime. Shovel neutralized residues into containers for disposal, or (if not available) cover area with sand or earth and shovel into disposal containers (*Environment Canada 1984). Other neutralizing agents are calcinated dolomite, calcium oxide and hydroxide, sodium carbonate. Place sulfuric acid absorbed in vermiculate in sealed containers (*NIOSH/OSHA 1981). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Notify proper authorities in case of water

SULFURIC ACID

SECTION VII (continued)

pollution. Do not touch spilled material. Use water spray to reduce vapor; do not get water inside container. Dike for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Butyl/Neoprene	GOOD/LIMITED
CPE	EXCELLENT/MANY
Chlorobutyl	GOOD/LIMITED
Neoprene	GOOD/LIMITED
Nitrile	POOR/LIMITED*
Nonwovwen PE	POOR/MANY
PE	GOOD/LIMITED
PVC	POOR/MANY
Saranex	EXCELLENT/MANY
Teflon	POOR/LIMITED
Viton	GOOD/LIMITED
Viton/Chlorobutyl	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for SULFURIC ACID

(7664-93-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Clear, colorless, oily liquid.

Odor - None.

Commercial Forms - Brownish when impure, 33 to 98% pure solutions.

Uses - Manufacture of dyestuffs, other acids, parchment paper, and glue; purification of petroleum; medication; electroplating; metallurgy; pigments; rayon; film; laboratory reagent and etchant; food additive; herbicide; gas drying; refining mineral and vegetable oils; leather industry; carbonization of wool fabrics; extraction of uranium from pitchblende; fertilizer; explosives; storage batteries.

Materials to Avoid - Water (except for use in emergency life support).

Caution: *Diluting sulfuric acid with water may result in a violent reaction. Highly toxic fumes may be liberated when heated. Finely divided combustible materials may ignite upon contact with sulfuric acid.*

Other Names - Battery acid, Chamber acid, Fertilizer acid, Nordhausen acid.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

SULFURIC ACID

Signs and Symptoms of Acute Sulfuric Acid Exposure:

Caution: *Sulfuric acid is extremely corrosive. Caution is advised.*

Signs and symptoms of acute ingestion of sulfuric acid may be severe and include salivation, intense thirst, difficulty in swallowing, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of sulfuric acid.

Acute inhalation exposure may result in sneezing, hoarseness, choking, laryngitis, dyspnea (shortness of breath), respiratory tract irritation, and chest pain. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, pulmonary edema, chronic bronchitis, and pneumonia may also occur.

If the eyes have come in contact with sulfuric acid, irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure may result in severe burns, pain, and dermatitis (red, inflamed skin).

Emergency Life-Support Procedures:

Acute exposure to sulfuric acid may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to sulfuric acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

SULFURIC ACID

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to sulfuric acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Rinse mouth with large amounts of water. Instruct victims not to swallow the water.

3. DO NOT induce vomiting or attempt to neutralize!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NITRIC ACID

CAS Registry Number: 7697-37-2

Synonyms: Aqua Fortis; Azotic Acid; Engraver's Acid; Hydrogen Nitrate; Nital; Nitric Acid (Red Fuming); Nitrous Fumes; Nitryl Hydroxide; Red Fuming Nitric Acid; Nitric Acid (White Fuming)

Chemical Formula: HNO_3

Molecular Weight: 63.01

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.17 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 181°F; 83°C (*Weast 1979); 248.9°F, 120.5°C for constant boiling acid at 68% nitric acid (Merck 1983, p. 943)

Specific Gravity (H_2O=1): 1.5027 at 25°C/4°C (*Weast 1979); 1.4134 at 20°C/4°C for 70% nitric acid (Merck 1983, p. 943)

Vapor Pressure (mmHg): 47.8 at 20°C (*Encyc Occupat Health and Safety 1983)

Melting Point: -44°F, -42°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in all proportions (*Weast 1979)

NITRIC ACID

SECTION II (continued)

Appearance and Odor: Colorless or yellow liquid with acrid odor (*Merck 1983; *CHRIS 1975).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 2 ppm (5 mg/m^3) (NIOSH 1987, p. 172)

ACGIH TLV: TWA 2 ppm (5 mg/m^3); STEL 4 ppm (10 mg/m^3) (*ACGIH 1984)

IDLH: 100 ppm (NIOSH/OSHA 1978, p. 138)

Other Limits Recommended: NIOSH: 2 ppm (5 mg/m^3) 10-hour TWA (NIOSH 1987, p. 172)

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 656)
Skin: Yes (Weiss 1980, p. 656)
Ingestion: Yes (Weiss 1980, p. 656)

Health Hazards (Acute, Delayed, and Chronic): This compound is a primary irritant, and causes burns and ulceration of all tissues and membranes that it contacts. This includes burns to the eyes and skin by contact, burns to the mouth, throat, esophagus, and stomach by ingestion, and the entire respiratory tract by inhalation. Circulatory collapse and shock is often the immediate cause of death (*Gosselin 1984). The approximate minimum lethal dose is 5 ml for a 150-lb person (*Arena 1979).

Medical Conditions Generally Aggravated by Exposure: Persons with skin, eye or cardiopulmonary disorders are at a greater risk (*Encyc Occupat Health and Safety 1983).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use water spray (NFPA 1984, pp. 49-67). Small fires: water, dry chemical, or soda ash. Large fires: flood fire area with water. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn (DOT 1984, Guide 44).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 44).

NITRIC ACID

SECTION IV (continued)

Unusual Fire and Explosion Hazards: May give off poisonous oxides of nitrogen and acid fumes when heated in fires (*CHRIS 1978). May ignite other combustible materials. Reactions with fuels may be violent. Runoff to sewer may create fire or explosion hazard (*DOT 1984). Noncombustible but dangerously reactive with many materials. Reacts explosively with metallic powders, carbides, hydrogen sulfide, and turpentine. Increases the flammability of combustible organic and readily oxidized materials. Can cause ignition of some of these materials (NFPA 1984, p. 49-67).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Moisture and heat (*Sax 1979).

Incompatibility (Materials to Avoid): Reacts violently with alcohol, turpentine, charcoal, and organic refuse (*Merck 1983). Reacts explosively with metallic powders, carbides, and hydrogen sulfide (*NFPA 1978). Powerful reducing agents may cause explosion (*Sax 1975).

Hazardous Decomposition or Byproducts: Will react with water or steam to produce heat, and toxic and corrosive fumes. When heated to decomposition, it emits nitrogen oxides (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacture of organic and inorganic nitrates, many different organic chemicals, dye intermediate, pharmaceuticals, jewelry and explosives (*SRI; *Merck 1983; *Encyc Occupat Health and Safety 1983).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away. Isolate the hazard area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces before entering them (*DOT 1984). Ventilate area of spill or leak. Flush with copious quantities of water and neutralize with alkaline material (such as soda ash, lime, etc.) (*NIOSH/OSHA 1981). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors; do not get water inside container. Small spills: flush area

NITRIC ACID

SECTION VII (continued)

with flooding amounts of water. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 44).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Butyl/Neoprene	GOOD/LIMITED
CPE	GOOD/LIMITED
Chlorobutyl	GOOD/LIMITED
Neoprene	GOOD/LIMITED
Nitrile	POOR/LIMITED*
PE	GOOD/LIMITED
PVC	POOR/MANY
Saranex	GOOD/LIMITED
Teflon	POOR/LIMITED
Viton	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for NITRIC ACID

(7697-37-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Nitric acid is extremely corrosive. Avoid contact with mists and decomposition fumes.*

Substance Characteristics:

Pure Form - Colorless or yellow liquid.

Odor - Sharp and biting.

Commercial Forms - 56, 68, and 70% pure, in water solution.

Uses - Chemical intermediate, fertilizer, veterinary medication, pharmaceuticals, explosives, steel pickling, manufacture of organic and inorganic nitrates, photoengraving.

Materials to Avoid - Alcohols, metal powders.

Other Names - Aqua Fortis, Azotic acid, Engraver's acid, hydrogen nitrate, Nital, nitrous fumes; nitryl hydroxide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

NITRIC ACID

Signs and Symptoms of Acute Nitric Acid Exposure:

Warning: *Nitric acid is extremely corrosive. Caution is advised.*

Signs and symptoms of acute ingestion of nitric acid may be severe and include increased salivation, intense thirst, difficulty swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of nitric acid.

Acute inhalation exposure may result in sneezing, hoarseness, choking, laryngitis, dyspnea (shortness of breath), respiratory tract irritation, and chest pain. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, pulmonary edema, chronic bronchitis, and pneumonia may also occur.

If the eyes have come in contact with nitric acid, irritation, pain, swelling, corneal erosion, and blindness may occur. Dermal exposure may result in severe burns, pain, and dermatitis (red, inflamed skin).

Emergency Life-Support Procedures:

Acute exposure to nitric acid may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to nitric acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

NITRIC ACID

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to nitric acid.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Rinse mouth with large amounts of water. Instruct victims not to swallow the water.

3. DO NOT induce vomiting or attempt to neutralize!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHORUS TRICHLORIDE

CAS Registry Number: 7719-12-2

Synonyms: Phosphine, Trichloro-; Phosphorous Chloride; Phosphorus Chloride (Cl6P2); Phosphorus Chloride (PCl3); Trichlorophosphine; Phosphorous Trichloride

Chemical Formula: PCl_3

Molecular Weight: 137.35

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (guinea pig) 0.28 mg/m3/4 hours (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 169°F, 76°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.574 at 21°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 100 at 21°C (*Merck 1983)

Melting Point: -170°F, -112°C (*Merck 1983)

Vapor Density (AIR=1): 4.75 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (*Merck 1983)

Appearance and Odor: Colorless, clear fuming liquid (*Merck 1983); pungent odor (*NFPA 1978).

PHOSPHORUS TRICHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.5 ppm (3 mg/m^3) (NIOSH 1987, p. 194)

ACGIH TLV: TWA 0.2 ppm (1.5 mg/m^3); STEL 0.5 ppm (3 mg/m^3) (*ACGIH 1983)

IDLH: 50 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1979)
Skin: Yes (*Sax 1979)
Ingestion: Yes (*Sax 1979)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic; it may cause death or permanent injury. Contact is highly irritating to the skin, eyes, and mucous membranes, and the material is an irritant through oral and inhalation exposure (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material will not burn (*NFPA 1978). Use carbon dioxide or dry chemical on fires involving phosphorus trichloride (*Sax 1979). Do not use water (Weiss 1980, p. 751).

Special Fire Fighting Procedures: Spray cooling water on containers that are exposed to flames until well after fire is out. Do not get water inside containers (*DOT 1984).

Unusual Fire and Explosion Hazards: This material will react violently with water (*NFPA 1978), producing heat and toxic and corrosive fumes (*Sax 1979). When heated to decomposition, it emits highly toxic fumes of chlorides and phosphorus oxides (*Sax 1979). It may ignite other combustible materials (*DOT 1984).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*NFPA 1978)
Stable:

Conditions to Avoid: Contact with water, steam, or acids (*Sax 1979).

PHOSPHORUS TRICHLORIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Reacts violently with water. Reacts explosively with acetic acid, aluminum, chromyl chloride, diallylphosphite and allyl alcohol, dimethyl sulfoxide, fluorine, hydroxylamine, iodine monochloride, lead dioxide, nitric acid, nitrous acid, organic matter, potassium, and sodium (*NFPA 1978).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorides and phosphorus oxides (*Sax 1979).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 751)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a chemical intermediate for phosphorus oxychloride, surfactants, and stabilizers (*SRI). It is also used as an intermediate for organophosphorus pesticides and for a number of other applications (*Hawley 1981).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not get water into containers. Do not touch spilled material. Use water spray to reduce vapors, but do not put water on leak or spill area. Keep combustibles away from spilled material. Dike spills for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED*
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

PHOSPHORUS TRICHLORIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Exposure may cause dizziness, headache, anorexia, respiratory difficulties, nausea and vomiting, and swelling. It can also cause liver and lung disturbances (*Rumack 1975 to Present). Occupational exposure has caused coughs, bronchitis, pneumonia, and conjunctivitis (*ACGIH 1980).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (*DOT 1984). Do not induce vomiting (*Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDROGEN PEROXIDE (Concentration greater than 52%)

CAS Registry Number: 7722-84-1

Synonyms: Albone; Albone DS; Hydrogen Dioxide; Hydrogen Dioxide Solution; Hydroperoxide; Inhibine; Perhydrol; Peroxaan; Superoxol; T-Stuff

Chemical Formula: H_2O_2

Molecular Weight: 34.02

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 306°F, 152°C (*Merck 1976); (greater than 52% solution) 258°F, 126°C (Dupont MSDS 1985)

Specific Gravity (H_2O=1): 1.463 at 0°C (*Merck 1976); 1.29 at 20°C (Weiss, 1986, p. 574); (greater than 52% solution) 1.3 at 20°C (Dupont MSDS 1985)

Vapor Pressure (mmHg): 1 at 15.3°C (Sax 1984, p. 1551)

Melting Point: 31°F, -0.43°C (*Merck 1976); (greater than 52% solution) -40°F, -40°C (Dupont MSDS 1985)

Vapor Density (AIR=1): 1.02 (calculated) (Dupont MSDS 1985)

Evaporation Rate (Butyl acetate=1): Not Found

HYDROGEN PEROXIDE

SECTION II (continued)

Solubility in Water: Soluble (Hawley 1981, p. 545)

Appearance and Odor: A crystalline solid at low temperatures (*Sax 1979). Slightly pungent, irritating odor (Dupont MSDS 1985).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (High-strength hydrogen peroxide) TWA 1 ppm (1.4 mg/m^3) (NIOSH 1987, p. 138)

ACGIH TLV: TWA 1 ppm (1.5 mg/m^3) (ACGIH 1986-87, p. 21)

IDLH: 75 ppm (NIOSH/OSHA 1978, p. 112)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1551)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (Sax 1984, p. 1551)

Health Hazards (Acute, Delayed, and Chronic): Strong irritant to skin, eyes, and mucous membranes (Sax 1984, p. 1551).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not flammable. Fires should be fought with water since the use of chemical extinguishants may accelerate decomposition (*Encyc Occupat Health and Safety 1971). Small fires: water only; no dry chemical or carbon dioxide. Large fires: flood fire area with water (*DOT 1984).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. For massive fire in cargo area, use unamnned hose older or monitor nozzles; if this is impossible, withdraw from area and let fire burn (*DOT 1984).

Unusual Fire and Explosion Hazards: Spontaneous ignition may occur when contact with combustible materials is made. Oxygen released in decomposition will promote combustion. Fires can be of the flaring type but are not explosive unless confined. Vapor concentration greater than 40

HYDROGEN PEROXIDE

SECTION IV (continued)

percent by weight can be decomposed explosively at 1 atmosphere pressure (*Encyc Occupat Health and Safety 1971). Severe explosion hazard when it is exposed to heat, mechanical impact, detonation of a blasting cap, or caused to decompose catalytically (*Martin 1978).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Hawley 1977)

Conditions to Avoid: Mechanical impact, uncovering the container (*Sax 1979); contact with combustible materials, light (*Merck 1976); temperatures above 35°C (*Osol 1975); hot wires, catalytic impurities (*Encyc Occupat Health and Safety 1971).

Incompatibility (Materials to Avoid): Oxidizable materials including iron, copper, brass, bronze, chromium, zinc, lead, manganese, silver, catalytic metals (NIOSH/OSHA 1978, p. 112).

Hazardous Decomposition or Byproducts: Decomposition can build up large pressures of oxygen and water which may then burst explosively (Sax 1984, p. 1551).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Bleaching and deodorizing of textiles, wood pulp, hair, fur, etc; source of organic and inorganic peroxides; pulp and paper industry; plasticizers; rocket fuel; foam rubber; manufacture of glycerol; antichlor; dyeing; electroplating; antiseptic; laboratory reagent; epoxidation; hydroxylation; oxidation and reduction; viscosity control for starch and cellulose derivatives; refining and cleaning metals; bleaching and oxidizing agent in foods; neutralizing agent in wine distillation; seed disinfectant; substitute for chlorine in water and sewage treatment (Hawley 1981, p. 545).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors; do not get water

HYDROGEN PEROXIDE

SECTION VII (continued)

inside container. Small dry spills: with clean shovel place material into clean, dry container and cover; move containers from spill area. Small spills: flush area with flooding amounts of water. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED
Butyl/Neoprene	GOOD/LIMITED*
Neoprene	GOOD/LIMITED*
Nitrile	POOR/LIMITED*
PVC	POOR/LIMITED
Teflon	POOR/LIMITED
Viton	GOOD/LIMITED*
Viton/Neoprene	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for HYDROGEN PEROXIDE (>52%)*

(7722-84-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Liquid above 0 degrees C (31 degrees F).

Odor - None.

Commercial Form - 27.5, 35, 50, and 70% pure solutions, usually mixed with water.

Uses - Manufacture of peroxides and glycerol; pulp and paper industry; metal refining and cleaning; rocket fuel component; substitute for chlorine in water and sewage treatment; wine distillation; electroplating; bleaching; deodorizing; oxygen source; seed disinfectant; antiseptic; manufacture of cosmetics, plasticizers, and foam rubber.

Materials to Avoid - Oxidizable materials, metals.

Caution: *Explosion potential is high. Hydrogen peroxide may ignite combustable materials.*

Other Names - Albone, Inhibine, Perhydrol, Peroxaan, Superoxol, T-stuff.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

*Only concentrations greater than 52% are listed under Section 302 of SARA Title III.

HYDROGEN PEROXIDE

Signs and Symptoms of Acute Hydrogen Peroxide Exposure:

Signs and symptoms of acute exposure to hydrogen peroxide may be severe and include irritation or burns to the skin, eyes, respiratory tract, mouth, esophagus, stomach, and intestines. Distension or rupture of the stomach and other hollow viscera may occur; vomiting is common. Corneal ulceration may develop.

Emergency Life-Support Procedures:

Acute exposure to hydrogen peroxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrogen peroxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydrogen peroxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

HYDROGEN PEROXIDE

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHORUS

CAS Registry Number: 7723-14-0

Synonyms: Black Phosphorus; Bonide Blue Death Rat Killer; Common Sense Cockroach and Rat Preparations; Exolit LPKN; Exolit VPK-n361; Phosphorus (White); Phosphorus (Yellow); Phosphorus (Red); Phosphorus, White, Molten (Dry); Phosphorus-31; Rat-Nip; Red Phosphorus; Violet Phosphorus

Chemical Formula: P

Molecular Weight: 30.97

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 3.03 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: White/Yellow: 536°F, 280°C (*Weast 1979) (ignites at 86°F, 30°C in moist air) (Merck 1983, p. 1060); Red: 536°F, 280°C (ignites at 500°F, 260°C) (Merck 1983, p. 1060)

Specific Gravity (H_2O=1): Red: 2.34; Violet: 2.36; Black: 2.70; White/Yellow: 1.8 at 20°C (*Weast 1979)

Vapor Pressure (mmHg): White/Yellow: 0.026 at 20°C (*NIOSH/OSHA 1981)

Melting Point: White/Yellow: 111.2°F, 44.1°C; Violet: 1094°F, 590°C; Red: 1094°F, 590°C at 43 atm (*Weast 1979)

Vapor Density (AIR=1): Red: 4.77; White/Yellow: 4.42 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: White/Yellow: 1 part/300,000 parts water. Black:

PHOSPHORUS

SECTION II (continued)

Very slightly soluble in cold water, insoluble in hot water (*Weast 1979).

Appearance and Odor: White/Yellow: White to yellow, soft, waxy solid (*NIOSH/OSHA 1981). It has a garlic-like odor (*Hayes 1983). Black: Polymorphic, orthorhombic crystalline form, amorphous form;. Red: Red to violet powder; polymorphic (Merck 1983, pp. 1059-1060). Violet: Violet monoclinic (*Weast 1979).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Yellow or white phosphorus) 0.1 mg/m^3 (NIOSH 1987, p. 194)

ACGIH TLV: (Yellow phosphorus) TWA 0.1 mg/m^3 (ACGIH 1986-87, p. 27)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*NIOSH/OSHA 1981)
Skin: Yes (*NIOSH/OSHA 1981)
Ingestion: Yes. Red is not poisonous unless contaminated with Yellow (*Gosselin 1976).

Health Hazards (Acute, Delayed, and Chronic): It is classified as super toxic. The probable lethal dose is less than 5 mg/kg (a taste or less than 7 drops) for 70 kg (150 lb.) person (*Gosselin 1976). Poisonous if swallowed or if fumes are inhaled (DOT 1984, Guides 32, 38). Yellow: Fumes are irritating to the respiratory tract and cause severe ocular irritation. On contact with the skin it may ignite and produce severe skin burns with blistering (*NIOSH/OSHA 1981). Red: Irritates eyes (*DASE 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: White/Yellow: Can be ignited under almost all normal temperature conditions. Red: Material that must be preheated before ignition can occur (*NFPA 1978).
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, sand, water spray, or foam. Large fires: water spray, fog, or foam. Cool containers that are exposed to flames with water from the side until well after fire is out (DOT 1984, Guides 32, 38).

Special Fire Fighting Procedures: White/Yellow: Deluge with water, taking care not to scatter, until fire is extinguished and phosphorus has

PHOSPHORUS

SECTION IV (continued)

solidified, then cover with wet sand or dirt. Red: Flood with water and when fire is extingushed, cover with wet sand or dirt. Extreme caution should be used during clean up since reignition may occur. Under certain conditions at high temperature, red phosphorus reverts to more hazardous white phosphorus (*NFPA 1978).

Unusual Fire and Explosion Hazards: Will reignite itself after fire is extinguished (*DOT 1984). White/Yellow: Ignites at approximately 86°F, 30°C in air; ignition temperature is higher when air is dry. Black: Does not catch fire spontaneously. Red: Catches fire when heated in air to approximately 500°F, 260°C and burns with formation of the pentoxide. Burns when heated in atmosphere of chlorine. Caution: Avoid contact with potassium chlorate, potassium permanganate, peroxides and other oxidizing agents; explosions may result on contact or friction (Merck 1983, pp. 1059-1060).

NFPA Flammability Rating: 3 (white or yellow); 1 (red)

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes White/Yellow: Darkens on exposure to light (Merck 1983, pp. 1059-1060). Gives off acrid fumes on exposure to air (*NIOSH/OSHA 1981). Ignites spontaneously in air at or above 30C (Merck 1983, pp. 1059-1060).
Stable: Yes. Black: stable in air (Merck 1983, pp. 1059-1060).

Conditions to Avoid: Avoid heat. Red: burning yields toxic oxides of phosphorus (*CHRIS 1978); White/Yellow: toxic gases and vapors such as phosphoric acid fumes are released (*NIOSH/OSHA 1981).

Incompatibility (Materials to Avoid): Red: Avoid uncontrolled contact with oxidizing agents, or with strong alkaline hydroxides. Can react violently with oxidizing agent in presence of air and moisture, liberating phosphorus acids and toxic, spontaneously flammable phosphine gas (*CHRIS 1978). White/Yellow: Air, all oxidizing agents including elemental sulfur, strong caustics (NIOSH/OSHA 1978, p. 156).

Hazardous Decomposition or Byproducts: Upon heating Red releases toxic oxides of phosphorus (*CHRIS 1978) and Yellow emits toxic gases and vapors such as phosphoric acid fumes (*NIOSH/OSHA 1981).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

PHOSPHORUS

SECTION VI -- USE INFORMATION

Major uses: rat poison; for smoke screens; gas analysis; fireworks; manufacturing safety matches, phosphoric acid, phosphine, phosphoric anhydride, phosphorus pentachloride, phosphorus trichloride, fertilizers, pesticides, smoke bombs, incendiary shells, tracer bullets; in organic synthesis (Merck 1983, pp. 1059-1060).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (*DOT 1984). Any clothing which becomes contaminated should be removed immediately (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHOSPHORUS

(7723-14-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - White or yellow: crystalline, waxlike transparent solid; Red: violet-red, amorphous powder; Black: solid resembling graphite.

Odor - Garliclike.

Commercial Forms - White or yellow: shipped under water in steel drums or tank cars; Red: in tins and drums.

Uses - Rat poison, fertilizers, pesticides, and other phosphorus-containing compounds; organic synthesis; manufacture of safety matches, fireworks, smoke bombs, incendiary shells, tracer bullets, and semiconductors.

Caution: *Flammable solid. Avoid sources of extreme heat or ignition including sparks or fire. White (or yellow) phosphorus may spontaneously ignite on contact with damp surfaces, including water or skin. Phosphorus will liberate toxic gases and vapors when heated.*

Materials to Avoid - Oxidizers, alkali, water (except for use in emergency life support).

Other Names - Exolit LPKN, Exolit VPK-n361, Rat-Nip.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, copper sulfate, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, dopamine, norepinephrine.

PHOSPHORUS

Signs and Symptoms of Acute Phosphorus Exposure:

Signs and symptoms of acute exposure to phosphorus may be severe and occur in three stages. The first stage will involve burns, pain, shock, intense thirst, nausea, vomiting, diarrhea, severe abdominal pain, and "smoking stools." The breath and feces may have garlicky odor. The second stage will be a symptom-free period of several days in which the patient appears to be recovering. The third stage may be severe and include nausea, bloody vomitus, diarrhea (may be bloody), jaundice, liver enlargement with tenderness, renal damage, hematuria (bloody urine), and either oliguria (little urine formation) or anuria (no urine formation). Headache, convulsions, delirium, coma, cardiac arrhythmias, and cardiovascular collapse may also occur.

If phosphorus contacts the eyes, then severe irritation and burns, blepharospasm (spasmodic winking), lacrimation (tearing), and photophobia (heightened sensitivity to light) may occur. Eye contact may lead to a total destruction of the eyes. Victims may experience spontaneous hemorrhaging of phosphorus-contaminated skin and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to phosphorus may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phosphorus.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

PHOSPHORUS

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phosphorus.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. Brush nonadherent phosphorus from skin areas, then flush skin with water. Immerse exposed skin areas in water or cover with a wet dressing.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for AT LEAST 15 MINUTES. Keep exposed eyes covered with wet compresses.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

4. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

5. Ambulate (walk) and give water to the victims.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BROMINE

CAS Registry Number: 7726-95-6

Synonyms: No Synonyms Found

Chemical Formula: Br_2

Molecular Weight: 159.81

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 139.2°F, 59.5°C (*Merck 1976)

Specific Gravity (H_2O=1): 3.1023 at 25°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 172 at 20.6°C (*Patty 1963)

Melting Point: 19.0°F, -7.25°C (*Merck 1976)

Vapor Density (AIR=1): 5.51 at 15°C (Hawley 1981, p. 149)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 3.52 g/100 cc water at 50°C (*Weast 1979)

Appearance and Odor: Heavy dark reddish-brown liquid or vapor (*Merck 1976, *Gosselin 1976, *NFPA 1978); solid forms are also found (*NRC 1980);

BROMINE

SECTION II (continued)

it has a suffocating odor (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 ppm (0.7 mg/m^3) (OSHA 1984, p. 661)

ACGIH TLV: TWA 0.1 ppm (0.7 mg/m^3); STEL 0.3 ppm (2 mg/m^3) (*ACGIH 1981)

IDLH: 10 ppm (NIOSH/OSHA 1978, p. 52)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Encyc Occupat Health and Safety 1971)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Inhalation exposure to 11-23 mg/m^3 produces severe choking. 30-60 mg/m^3 is extremely dangerous. 200 mg/m^3 is fatal in a short time. Vapors can cause acute as well as chronic poisoning. It has cumulative properties (*Encyc Occupat Health and Safety 1971). It is irritating to the eyes and respiratory tract (*NFPA 1978). Poisoning is due to the corrosive action on the gastrointestinal tract. Nervous, circulatory and renal disturbances occur after ingestion. Ingestion of liquid can cause death due to circulatory collapse and asphyxiation from swelling of the respiratory tract (*Gosselin 1976). The lowest oral lethal dose reported for humans is 14 mg/kg. The lowest lethal inhalation concentration reported for humans is 1000 ppm (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Nonflammable, but a strong oxidizer (NFPA 1984, p. 49-12). Extinguish with dry chemical, carbon dioxide, water spray, fog or foam (DOT 1984, Guide 59).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special protective clothing. Move containers from fire area. Cool containers that are exposed to flames with water (DOT 1984, Guide 59).

Unusual Fire and Explosion Hazards: Will cause ignition of organic materials; spontaneous ignition possible when combined with potassium, phosphorus and tin (*Encyc Occupat Health and Safety 1971) and a wide variety of other chemicals (Sax 1984, p. 519). It reacts explosively with

BROMINE

SECTION IV (continued)

acetylene, acrylonitrile, ammonia, dimethyl formamide, ethyl phosphine, hydrogen, isobutyrophenone, nickel carbonyl, nitrogen triiodide, ozone, oxygen difluoride, phosphorus, potassium, silver azide, sodium and sodium carbide (*NFPA 1978).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (NFPA 1984, p. 49-21)

Conditions to Avoid: Vaporizes rapidly at room temperature (Merck 1983, p. 192)

Incompatibility (Materials to Avoid): Bromine is incompatible with a wide variety of materials including alkali hydroxides; arsenites; ferrous, mercurous salts; hypophosphites and other oxidizable substances (Merck 1983, p. 192).

Hazardous Decomposition or Byproducts: When heated it emits highly toxic fumes and will react with water or steam to product toxic and corrosive fumes (Sax 1980, p. 519).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

For gold extraction; military gas; bleaching fibers and silks; manufacture of medicinal bromine compounds, anti-knock compounds (ethylene bromide) for gasoline (*Merck 1976). For fire-retardant for plastics; in photography; shrink-proofing wool; in organic synthesis; solvents; intermediate for fumigants; fire-extinguishing fluid; and analytical reagents (*Hawley 1977). Also used as a refrigerant and dehumidifying agent and for swimming pool sanitation and water purification (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill or leak. Collect for reclamation by absorbing it in vermiculite, dry sand, earth, or a similar material and disposing in sealed containers in secured sanitary landfill (*NIOSH/OSHA 1981). Potassium carbonate, sodium carbonate, sodium bicarbonate, lime, and sodium hydroxide solutions are neutralizing agents for liquid bromine spills (*Clayton and Clayton 1981-82). Do not touch material, stop leak if possible without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place in

BROMINE

SECTION VII (continued)

container. Large spills: dike spill for later disposal (DOT 1984, Guide 59).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

PE	POOR/MANY

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for BROMINE

(7726-95-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Bromine toxicity can occur via inhalation, dermal/eye contact, or ingestion. Special personal protective equipment may be required. Caution is advised.*

Substance Characteristics:

Pure Forms - Dark reddish-brown liquid; solid below -7 degrees C (19 degrees F).

Note: Bromine has a significant vapor pressure.

Odor - Suffocating.

Commercial Form - Liquid in bottles, drums, tank cars, tank trucks.

Uses - Swimming pool sanitation; water purification; bleaching; shrink proofing; gold extraction; intermediate for gasoline additives, fire retardants, fumigants, and refrigerants.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, isoproterenol inhaler, normal saline, D5W, Ringer's lactate.

BROMINE

Signs and Symptoms of Acute Bromine Exposure:

Warning: *Effects may be delayed for several hours. Caution is advised.*

Signs and symptoms of acute exposure to bromine may include hypotension (low blood pressure), tachycardia (rapid heart rate), cyanosis (blue tint to the skin and mucous membranes), and circulatory collapse. Neurological effects may include headache, dizziness, delirium, stupor, and shock.

Gastrointestinal effects may include vomiting (vomitus may be blue), diarrhea, abdominal pain, and bloody stools. Nephritis with oliguria (scanty urination) and anuria (absence of urine formation) has been reported. Bromine is irritating to the skin, eyes, and mucous membranes; brown discoloration of the mucous membranes, lips, and tongue may be observed. Lacrimation (tearing), photophobia (heightened sensitivity to light), nosebleeds, coughing, asphyxiation, and pulmonary edema may also occur. A burning pain in the mouth and esophagus generally follows ingestion.

Emergency Life-Support Procedures:

Acute exposure to bromine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying and supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to bromine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

BROMINE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to bromine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed IMMEDIATELY with lukewarm water for at least 15 minutes.

5. IMMEDIATELY wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CALCIUM ARSENATE

CAS Registry Number: 7778-44-1

Synonyms: Arsenic Acid, Calcium Salt (2:3); Calcium Arsenate, Solid (DOT); Calcium Orthoarsenate; Calcium-O-Arsenate; Calciumarsenat; Chip-Cal Granular; Cucumber Dust; FLAC; KALO; Kilmag; Pencal; Security; Spra-Cal; Spracal; Tricalcium Arsenate; Tricalcium Ortho-Arsenate; Tricalcium-O-Arsenate

Chemical Formula: $As_2O_8 \cdot 3Ca$

Molecular Weight: 398.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1000 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 3.620 (*Clayton and Clayton 1981-82)

Vapor Pressure (mmHg): Not Found

Melting Point: 1455°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.13 g/liter at 77°F, 25°C (*Clayton and Clayton 1981-82)

CALCIUM ARSENATE

SECTION II (continued)

Appearance and Odor: Colorless (*Weast 1979) or white powder (*Worthing 1979); odorless (*CHRIS 1978)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p. 68)

ACGIH TLV: (Arsenic and soluble compounds) TWA 0.2 mg/m^3 as arsenic (ACGIH 1986-87, p. 10)

IDLH: 100 mg/m^3 (NIOSH/OSHA 1978, p. 58)

Other Limits Recommended: Occupational exposure to inorganic arsenic recommended standard -- Ceiling concentration 0.002 mg/m^3/15 minutes, air (*NIOSH/RTECS 1985). NIOSH occupational carcinogen (NIOSH 1987, P. 68)

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Not Found
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose for humans is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150 lb. person (*Gosselin 1976). It is an irritant to eyes, respiratory tract, mouth and stomach (*CHRIS 1978). Damage to kidneys, liver and the nervous system have been reported (*Rumack 1975 to Present). (Non-Specific -- Arsenic) Chronic exposure can cause bone marrow damage, often leading to aplastic anemia. There is epidemiological evidence that chronic ingestion of arsenic compounds causes a predisposition to skin cancers (*Gilman 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not flammable (Weiss 1980, p. 210) For small fires, use dry chemical, water spray, or foam. For large fires, use water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases (*DOT 1984).

CALCIUM ARSENATE

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1986, p. 219)

Conditions to Avoid: Heat (*Hawley 1977)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, calcium arsenate produces toxic fumes of arsenic (Sax 1984, p. 317).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 210)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide and herbicide (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE

(Steps to be Taken in Case Material is Released or Spilled)

Stay upwind; keep out of low areas. Do not touch spilled material. Take up small solution spills with sand or other noncombustible absorbent material and place into containers for later disposal. For small dry spills, use clean shovel to place material in clean, dry container. For large spills, dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CALCIUM ARSENATE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CALCIUM ARSENATE

(7778-44-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless or white powder.

Odor - None.

Commercial Form - 70% pure mixture with calcium carbonate and calcium hydroxide.

Uses - Pesticide.

Caution: *Avoid sources of heat including fire. Calcium arsenate will liberate toxic arsenic fumes when heated to decomposition.*

Other Names - Cucumber dust, FLAC, KALO, Kilmag, Pencal, Spracal, tricalcium arsenate, tricalcium ortho-arsenate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, dopamine, norepinephrine, sodium bicarbonate, dimercaprol, penicillamine, isoproterenol.

CALCIUM ARSENATE

Signs and Symptoms of Acute Calcium Arsenate Exposure:

Warning: *Effects usually appear within 30 minutes of exposure but may be delayed for several hours. Caution is advised.*

Hypotension (low blood pressure), tachycardia (rapid heart rate), dehydration, intense thirst, difficulty swallowing, vomiting, abdominal pain, and diarrhea are among the first signs and symptoms noticed following acute calcium arsenate exposure. Headache, conjunctivitis (red, inflamed eyes), runny nose, and lacrimation (tearing) are also common. Garlic odor of breath and feces may be noted.

Cardiovascular effects include shock, tachycardia (rapid heart rate), ventricular fibrillation, and other cardiac abnormalities. Pulmonary edema may occur. Altered mental status, seizures, and delirium are further complications of calcium arsenate exposure. Intense muscle cramping is common. Exposure to airborne dust is generally accompanied by irritation of exposed skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to calcium arsenate may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to calcium arsenate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. RUSH to a health care facility!

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

CALCIUM ARSENATE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to calcium arsenate.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. THOROUGHLY wash exposed skin areas with soap and water.

6. RUSH to a health care facility!

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. RUSH to a health care facility!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of calcium arsenate is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of calcium arsenate may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5.*

CALCIUM ARSENATE

The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FLUORINE

CAS Registry Number: 7782-41-4

Synonyms: Fluorine-19

Chemical Formula: F_2

Molecular Weight: 38.0

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.23 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -306.6°F, -188.13°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.5127 at -306.6°F, -188.13°C (liquid) (*Merck 1983)

Vapor Pressure (mmHg): 760 at -306.2°F, -187.9°C (*Weast 1979)

Melting Point: -363.3°F, -219.6°C (*Merck 1983)

Vapor Density (AIR=1): 1.695 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Reacts with water (*Merck 1983)

Appearance and Odor: Pale yellow to greenish yellow gas having a characteristic pungent odor (*Merck 1983; *Weast 1979).

FLUORINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 ppm (0.2 mg/m^3) (NIOSH 1987, p. 128)

ACGIH TLV: TWA 1 ppm (2 mg/m^3); STEL 2 ppm (4 mg/m^3) (*ACGIH 1984)

IDLH: 25 ppm (NIOSH/OSHA 1978, p. 104)

Other Limits Recommended: EEGL 7.5 ppm (60 minutes) (NRC 1984a, pp. 77-88).

Routes of Entry: **Inhalation:** Yes (*Merck 1983)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Poisonous; may be fatal if inhaled. Vapor extremely irritating. Contact may cause burns to skin and eyes (*DOT 1984). Chronic absorption may cause osteosclerosis and calcification of ligaments (*Merck 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fire, use dry chemical or carbon dioxide. For large fire, use water spray, fog, or foam. For massive fire in cargo area, use unmanned hose holder or monitor nozzles (*DOT 1984).

Special Fire Fighting Procedures: A few whiffs of the gas or vapor could cause death. Gas, vapor or liquid could be fatal on penetrating the firefighters' normal full protective clothing. Only special protective clothing designed to protect against fluorine should be used; the normal full protective clothing available to the average fire department will not provide adequate protection. Do not direct water onto fluorine leaks as the fire may be intensified (*NFPA 1978).

Unusual Fire and Explosion Hazards: May ignite other combustible materials (wood, paper, oil, etc.) Mixture with fuels may explode. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors, or in sewers (*DOT 1984).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

FLUORINE

SECTION V (continued)

Conditions to Avoid: Keep gas in tank, avoid exposure to all other materials (*Merck 1983)

Incompatibility (Materials to Avoid): Avoid contact with all oxidizable materials, including organic materials (*Merck 1983). Will react violently with water and most organic materials to produce heat and toxic fumes (*Sax 1979).

Hazardous Decomposition or Byproducts: Poisonous gas is produced in fire (*CHRIS 1980).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Manufacture of fluorochemicals and plastics; rocket propellant (*Weast 1979). Chemical intermediate for sulfur hexafluoride, chlorine trifluoride, bromine trifluoride, uranium hexafluoride, molybdenum hexafluoride, perchloryl fluoride, oxygen difluoride (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe gas or vapor; do not allow vapor to contact skin or eyes (see Section III above). Stop leak if you can do it without risk. Use water spray to reduce vapors but do not put water on leak or spill area. Isolate area until gas has dispersed. A fine water spray applied to the edge of the spill pool will start a hot flare fire which will burn the spilled material. (Use extreme caution.) (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

FLUORINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED*
Neoprene	GOOD/LIMITED*
PVC	GOOD/LIMITED*
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inhalation of fluorine causes coughing, choking, and chills. An asymptomatic period of 1 to 2 days followed by fever, cough, tightness in chest, rales, and cyanosis indicate pulmonary edema (*Dreisbach 1977). Small amounts of gas in air can have a strong caustic effect on the cornea, eyelids, nose (*Grant 1974, *Merck 1983).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, establish respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin and eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation. (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLORINE

CAS Registry Number: 7782-50-5

Synonyms: Bertholite; Molecular Chlorine

Chemical Formula: Cl_2

Molecular Weight: 70.91

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.4 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -30.3°F, -34.6°C (*Weast 1983)

Specific Gravity (H_2O=1): 1.424 at 15°C (Weiss 1986, p. 252)

Vapor Pressure (mmHg): 7600 at 30°C (*Weast 1983)

Melting Point: -150°F, -101°C (*Weast 1983)

Vapor Density (AIR=1): 2.49 (Sax 1986, p. 32)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.57 g/100 mL at 30°C (*Weast 1983)

Appearance and Odor: Greenish-yellow gas with suffocating odor (*Merck 1983).

CHLORINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 1 ppm, 3 mg/m^3 (OSHA 1984)

ACGIH TLV: TWA 1 ppm (3 mg/m^3); STEL 3 ppm (9 mg/m^3) (*ACGIH 1980)

IDLH: 30 ppm (NIOSH 1987, p. 74)

Other Limits Recommended: Occupational Exposure to Chlorine Recommended Standard: 15-minute ceiling 0.5 ppm (*NIOSH/RTECS 1985); EEGL 3.0 ppm (60 minutes) (NRC 1984b, pp. 5-11)

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 64)
Skin: Yes (NIOSH/OSHA 1978, p. 64)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Poisonous; may be fatal if inhaled. Contact may cause burns to skin and eyes (*DOT 1984).

Medical Conditions Generally Aggravated by Exposure: Bronchitis or chronic lung conditions (*ITI 1982).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Will not burn, but most combustible materials will burn in chlorine as they do in oxygen; flammable gases will form explosive mixtures with chlorine (*NFPA 1978). Dry chemical, carbon dioxide, water spray, fog or foam (DOT 1984, Guide 20).

Special Fire Fighting Procedures: Evacuate area endangered by gas. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 20). If it is necessary to stop the flow of gas, use water spray to direct escaping gas away from those effecting shut-off (*NFPA 1978).

Unusual Fire and Explosion Hazards: May ignite other combustible materials (wood, paper, oil, etc.). Mixture with fuels may cause explosion. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers (DOT 1984, Guide 20). Hydrogen and chlorine mixtures (5-95%) are exploded by almost any form of energy (heat, sunlight, sparks, etc.) (*NFPA 1978). May combine with water or steam to produce toxic and corrosive fumes of hydrochloric acid (*Environ Canada 1981).

CHLORINE

SECTION IV (continued)

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Heat and contact with hydrogen gas or powdered metals (*NFPA 1978).

Incompatibility (Materials to Avoid): Plastics and rubber (*NIOSH/OSHA 1981)

Hazardous Decomposition or Byproducts: Emits highly toxic fumes when heated (*Sax 1975).

Hazardous Polymerization: **May Occur:** **Not Found**
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Manufacture of chlorinated lime used in bleaching; manufacture of synthetic rubber and plastics; purifying water; detinning and dezincing iron (*Merck 1983).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak of you can do it without risk. Use water spray to reduce vapor but do not put water on leak or spill area. Isolate area until gas has dispersed. (*DOT, 1984)

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CHLORINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	POOR/LIMITED*
Butyl/Neoprene	GOOD/LIMITED
CPE	GOOD/LIMITED*
Neoprene	GOOD/LIMITED
Nitrile	POOR/LIMITED*
PE	POOR/MANY
PVC	POOR/MANY
Saranex	GOOD/LIMITED
Viton	GOOD/LIMITED
Viton/Neoprene	GOOD/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CHLORINE

(7782-50-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Greenish-yellow gas.

Odor - Pungent, suffocating.

Commercial Forms - Gas in cylinders; liquid in 100- and 150-pound steel cylinders, tank cars and barges, motor trucks, pipelines.

Uses - Chemical synthesis, swimming pool sanitation, water purification, food processing, shrink proofing, metal processing, batteries, bleaching agent, intermediate for gasoline additives, flame-retardant compounds, refrigerants.

Other Names - Bertholite, molecular chlorine.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate, isoproterenol inhaler, sodium bicarbonate.

Signs and Symptoms of Acute Chlorine Exposure:

Warning: *Effects may be delayed. Caution is advised. Chlorine is corrosive and may be converted to hydrochloric acid in the lungs.*

Signs and symptoms of acute exposure to chlorine may include tachycardia (rapid heart rate), hypertension (high blood pressure) followed by hypotension (low blood pressure), and cardiovascular collapse. Pulmonary edema and pneumonia are often seen.

CHLORINE

The eyes, nose, throat, and chest may sting or burn following exposure to chlorine. Cough with bloody sputum, a feeling of suffocation, dizziness, agitation, anxiety, nausea, and vomiting are common. Dermal exposure may result in sweating, pain, irritation, and blisters.

Emergency Life-Support Procedures:

Acute exposure to chlorine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as chlorine-resistant plastic sheeting and disposable bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to chlorine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to chlorine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas for at least 15 minutes with soap and water.

CHLORINE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SELENIOUS ACID

CAS Registry Number: 7783-00-8

Synonyms: Monohydrated Selenium Dioxide; Selenous Acid

Chemical Formula: H_2O_3Se

Molecular Weight: 128.98

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} oral (rat) 25 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000/10,000 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): In Selenium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 3.004 at 15°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 2 at 15°C (*Merck 1976)

Melting Point: Decomposes at 158°F, 70°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 90 parts/100 parts at 32°F, 0°C (*Merck 1976)

Appearance and Odor: Colorless solid (*Merck 1976, *Weast 1979); transparent, colorless crystals (Sax 1984, p. 2390)

SELENIOUS ACID

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Selenium compounds) TWA 0.2 mg/m^3 as selenium (NIOSH 1987, (p. 206)

ACGIH TLV: (Selenium compounds) TWA 0.2 mg/m^8, as selenium (ACGIH 1986-87, p. 29)

IDLH: Not Found

Other Limits Recommended: Toxicity information: IDLH for selenium compounds 100 mg/m^3 (NIOSH 1987, p. 206).

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Selenious acid and its salts are capable of penetrating the skin and can produce acute poisonings (*Rumack 1975 to Present). Causes irritations and burns of the skin (*Friberg 1979). It is highly toxic orally. Inorganic selenium compounds may cause dermatitis (Sax 1984, p. 2390).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Avoid heating (Sax 1984, p. 2390)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it

SELENIOUS ACID

SECTION V (continued)

emits toxic fumes of selenium (Sax 1984, p. 2390)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a reagent for alkaloids and as an oxidizing agent (*Merck 1976). Isotope is used in labeling radiopharmaceuticals (*Nuclear Medicine Communication 3(4)247 1982).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). Ventilate area of spill. Collect spilled material in most convenient and safe manner and deposit in sealed containers for reclamation or disposal in a secured disposal landfill. Liquid containing selenium inorganic compounds should be absorbed in vermiculite, dry sand, earth or similar material (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Toxic effects are similar to those of selenium and other selenium compounds. Garlic odor of breath is a common symptom. Pallor, nervousness, depression, and digestive disturbances have been reported in cases of chronic exposure (Sax 1984, p. 2390). The most common industrial injuries are irritations and burns of the skin (*Friberg 1979).

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDROGEN SULFIDE

CAS Registry Number: 7783-06-4

Synonyms: Dihydrogen Monosulfide; Dihydrogen Sulfide; Hydrogen Sulphide; Hydrosulfuric Acid; Sewer Gas; Stink Damp; Sulfur Hydride; Sulfureted Hydrogen

Chemical Formula: H_2S

Molecular Weight: 34.08

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302:

Chemical does not meet the toxicity criteria but because of its high production volume and recognized toxicity it is considered a chemical of concern.

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -76.59°F, -60.33°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.916 at -60°C (Liquid) (Weiss 1980, p. 518); 1.54 g/L at 0°C (*Merck 1976)

Vapor Pressure (mmHg): 20 atmospheres at 25.5°C (*Weast 1979)

Melting Point: -121.9°F, -85.49°C (*Merck 1976)

Vapor Density (AIR=1): 1.19 (*Merck 1976)

Evaporation Rate (Butyl acetate=1): Not Found

HYDROGEN SULFIDE

SECTION II (continued)

Solubility in Water: 1 gram dissolves in 242 mL at 20°C (*Merck 1976)

Appearance and Odor: Colorless gas with the characteristic odor of rotten eggs (*Weast 1979; *Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 20 ppm; Peak 50 ppm, 10 minutes (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 10 ppm (14 mg/m^3); STEL 15 ppm (21 mg/m^3) (*ACGIH 1980)

IDLH: 300 ppm (NIOSH/OSHA 1978, p. 112)

Other Limits Recommended: NIOSH: 10 ppm 10-minute ceiling (NIOSH 1987, p. 140). EEGL 10.0 ppm (24 hour) (NRC 1985a, pp. 55-68).

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Exposure to very high concentrations causes immediate death (Sax 1984, p. 1552). Also death or permanent injury may occur after very short exposure to small quantities (*Sax 1975). It acts directly upon the nervous system resulting in paralysis of respiratory centers (*Casarett 1975).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: 4.3% (*NFPA 1978)
UEL: 45% (*NFPA 1978)

Extinguishing Methods: A very flammable gas (*NFPA 1978). For small fires let burn unless leak can be stopped immediately. For large fires, use water spray, fog or foam (*DOT 1984).

Special Fire Fighting Procedures: Stop flow of gas. Use water to keep fire-exposed containers cool and to protect men effecting the shut-off (*NFPA 1978). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Evacuate area endangered by gas. Move container from fire area. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration on tank due to fire. Cool containers with water using unmanned device until well after

HYDROGEN SULFIDE

SECTION IV (continued)

the fire is out. Isolate for one-half mile in all directions if tank car or truck is involved in fire (*DOT 1984).

Unusual Fire and Explosion Hazards: Compound is heavier than air and may travel a considerable distance to source of ignition and flash back. It forms explosive mixtures with air over a wide range. Also reacts explosively with bromine pentafluoride, chlorine trifluoride, nitrogen triiodide, nitrogen trichloride, oxygen difluoride, and phenyl diazonium chloride (*NFPA 1978). When heated to decomposition, it emits highly toxic fumes of oxides of sulfur (Sax 1984, p. 1552).

NFPA Flammability Rating: 4

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*NFPA 1978)

Conditions to Avoid: Avoid physical damage to containers; sources of ignition; storage near nitric acid, strong oxidizing materials, and corrosive liquids or gases (*NFPA 1978).

Incompatibility (Materials to Avoid): Incompatible with many materials including strong oxidizers, metals (NIOSH/OSHA 1978, p. 112), strong nitric acid, bromine pentafluoride, chlorine trifluoride, nitrogen triiodide, nitrogen trichloride, oxygen difluoride and phenyl diazonium chloride (*NFPA 1978).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of oxides of sulfur (Sax 1984, p. 1552).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used in the manufacturing of chemicals; in metallurgy; analytical reagent; agricultural disinfectant; intermediate for sulfuric acid, elemental sulfur, sodium sulfide, and other inorganic sulfides; additives in extreme pressure lubricants and cutting oils; and as an intermediate for organic sulfur compounds (*Merck 1976; *Encyc Occupat Health and Safety 1971; *SRI). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

HYDROGEN SULFIDE

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. Shut off ignition sources; no flares, smoking or flames in hazard area. Use water spray to reduce vapors. Isolate area until gas has dispersed. (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED*
CPE	GOOD/LIMITED*
Neoprene	GOOD/LIMITED*
PVC	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for HYDROGEN SULFIDE

(7783-06-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Caution: *Hydrogen sulfide toxicity can occur via inhalation or dermal/eye contact, and death may occur within minutes. IMMEDIATELY begin administering 100% oxygen and RUSH victims to a health care facility!*

Substance Characteristics:

Pure Forms - Colorless gas or liquid under pressure.

Odor - Similar to rotten eggs.

Commercial Forms - Gas in steel cylinders, or liquid at 350 to 400 psi in 60-ton tank cars.

Uses - Metallurgy, analytical reagent, agricultural disinfectant, chemical intermediate.

Materials to Avoid - Oxidizers, metals, halogenated compounds.

Caution: *Highly flammable. Explosion potential is high. Avoid sources of extreme heat or ignition including sparks or fire. Combustion produces irritating sulfur oxides. Hydrogen sulfide may react explosively with strong oxidizers.*

Other Names - Hydrosulfuric acid, sulfur hydride, sulfureted hydrogen.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, dopamine, norepinephrine, amyl nitrite, sodium nitrite, pyridoxine, atropine.

HYDROGEN SULFIDE

Signs and Symptoms of Acute Hydrogen Sulfide Exposure:

Warning: *Caution is advised. Vital signs should be monitored closely.*

Signs and symptoms of acute exposure to hydrogen sulfide may include tachycardia (rapid heart rate) or bradycardia (slow heart rate), hypotension (low blood pressure), cyanosis (blue tint to skin and mucous membrane), cardiac palpitations, and cardiac arrhythmias. Dyspnea (shortness of breath), tachypnea (rapid respiratory rate), bronchitis, pulmonary edema, respiratory depression, and respiratory paralysis may occur.

Neurological effects include giddiness, irritability, drowsiness, weakness, confusion, delirium, amnesia, headache, sweating, and dizziness. Muscle cramping, tremor, excessive salivation, cough, convulsions, and coma may be noted. Nausea, vomiting, and diarrhea are commonly seen. Exposure to hydrogen sulfide gas may result in skin irritation, lacrimation (tearing), inability to detect odors, photophobia (heightened sensitivity to light), and blurred vision.

Emergency Life-Support Procedures:

Acute exposure to hydrogen sulfide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to hydrogen sulfide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility!

HYDROGEN SULFIDE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to hydrogen sulfide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas for at least 15 minutes with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility!

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- HYDROGEN SELENIDE

CAS Registry Number: 7783-07-5

Synonyms: Dihydrogen Selenide; Selane; Selenium Anhydride; Selenium Dihydride; Selenium Hydride

Chemical Formula: H_2Se

Molecular Weight: 80.98

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (guinea pig) 0.28 mg/liter/10 minutes (*NIOSH/RTECS 1985)

TPQ: 10 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Selenium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -42.3°F, -41.3°C (*Merck 1976)

Specific Gravity (H_2O=1): 2.12 at -42°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 6536 at 18°C; 9120 at 30.8°C (*Merck 1976)

Melting Point: -86.31°F, -65.73°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 270 ml in 100 ml at 72.5°F, 22.5°C (*Merck 1976)

Appearance and Odor: Colorless gas with an odor resembling decayed horseradish (*Patty 1963)

HYDROGEN SELENIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.05 ppm (0.2 mg/m^3) (NIOSH 1987, p. 138)

ACGIH TLV: TWA 0.05 ppm (0.2 mg/m^3) (ACGIH 1986-87, p. 21)

IDLH: 2 ppm (NIOSH/OSHA 1978, p. 112)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (DOT 1984, Guide 18)
Skin: Yes (DOT 1984, Guide 18)
Ingestion: Yes (DOT 1984, Guide 18)

Health Hazards (Acute, Delayed, and Chronic): It is a hazardous compound which can cause damage to the lungs and liver (Sax 1984, p. 1551).

Medical Conditions Generally Aggravated by Exposure: Those experiencing dermatitis, chronic bronchitis, or any form of skin allergy or respiratory tract infection are at a greater risk (*Friberg 1979).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Extremely flammable (DOT 1984, Guide 18)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Let tank car, tank truck, or storage tank burn unless leak can be stopped. Small fires: dry chemical or carbon dioxide. Large fires: water spray, fog, or foam (DOT 1984, Guide 18).

Special Fire Fighting Procedures: Isolate for 1/2 mile in all directions if tank car or truck is involved in fire. Stay upwind; keep out of low areas. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Wear self-contained breathing apparatus and full protective clothing. Cool containers that are exposed to flames with water until well after the fire is out (DOT 1984, Guide 18).

Unusual Fire and Explosion Hazards: It is extremely flammable; 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 (DOT 1984, Guide 18). It is dangerous and forms explosive mixtures with air (*Sax 1979).

NFPA Flammability Rating: Not Found

HYDROGEN SELENIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: It should be stored out of the direct rays of the sun (*Sax 1975). Keep away from heat and flames (Sax 1984, p. 1552).

Incompatibility (Materials to Avoid): Incompatible with acid, water, halogenated hydrocarbons, oxidizers, hydrogen peroxide, and nitric acid (*Sax 1979; NIOSH/OSHA 1978, p. 112).

Hazardous Decomposition or Byproducts: It can decompose into toxic fumes (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is an intermediate for metal selenides and organoselenium compounds. Also used in doping gas for preparation of semiconductor materials (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition sources; no flares, smoking, or flames in hazard area. Stop leak if you can do it without risk. Use water spray to reduce vapors; isolate area until gas has dispersed (DOT 1984, Guide 18).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms may include garlic odor on breath, dizziness, nausea, vomiting, labored breathing, bluing of skin, pulmonary edema, metallic taste, coughing, nasal secretion, pain in the chest, difficulty in breathing, irritation of the eyes, irritation of the respiratory tract resulting in bronchitis and conjunctivitis (*Browning

HYDROGEN SELENIDE

SECTION IX (continued)

1969, *Hamilton 1974; *Patty 1963, *Merck 1976, *Clayton and Clayton 1981-82).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 18).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SULFUR TETRAFLUORIDE

CAS Registry Number: 7783-60-0

Synonyms (SANSS 1983 Synonyms): Sulfur Fluoride (SF4), (T-4)-; Tetrafluorosulfurane

Chemical Formula: SF_4

Molecular Weight: 108.06

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rat) 0.08 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -40°F, -40°C (Weast 1979, p. B-131)

Specific Gravity (H_2O=1): Liquid at -108°F, -78°C: 1.95; Solid at -297°F, -183°C: 2.349 (Merck 1983, p. 1289)

Vapor Pressure (mmHg): Not Found

Melting Point: -191°F, -124°C (Weast 1979, p. B-131)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water (Weast 1979, p. B-131)

Appearance and Odor: Gas (Weast 1979, p. B-131); colorless (Merck 1983, p. 1289).

SULFUR TETRAFLUORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Fluorides) TWA 2.5 mg/m^3, as fluoride (NIOSH 1987, p. 126)

ACGIH TLV: Ceiling 0.1 ppm (0.4 mg/m^3) (AGCIH 1986-87, p. 30)

IDLH: Not Found

Other Limits Recommended: (Fluorides) NIOSH: 2.5 mg/m^3 10-hour TWA, as fluorine (NIOSH 1987, p. 126). IDLH for fluorides 500 mg/m^3 (NIOSH 1987, p. 126).

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 983)
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by inhalation; it is a strong irritant to eyes and mucous membranes (Hawley 1981, p. 983). Poisonous; may be fatal if inhaled. Contact may cause burns to skin and eyes. Contact with liquid may cause frostbite (DOT 1984, Guide 15).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material is non-combustible (Hawley 1981, p. 983). Small fires: dry chemical or carbon dioxide. Large fires: water spray, fog or foam. Do not get water inside container. Move container from fire area if you can do so without risk. Stay away from ends of tanks. Spray cooling water on containers that are exposed to flames until well after fire is out. Isolate area until gas has dispersed (DOT 1984, Guide 15).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and full protective clothing. Evacuate area endangered by gas (DOT 1984, Guide 15).

Unusual Fire and Explosion Hazards: Container may explode in heat of fire (DOT 1984, Guide 15).

NFPA Flammability Rating: Not Found

SULFUR TETRAFLUORIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, thermostable to 600°C (Merck 1983, p. 1289)

Conditions to Avoid: Reacts violently with water (Merck 1983, p. 1289)

Incompatibility (Materials to Avoid): Reacts violently with water. It is decomposed by concentrated sulfuric acid (Merck 1983, p. 1289).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of fluorides and sulfur oxides (Sax 1984, p. 2492).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a selective fluorinating agent (Merck 1983, p. 1289).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe vapors (see Section III above). Stop leak if you can do so without risk. Do not put water on leak or spill area. Small spills: flush area with flooding amounts of water. Large spills: dike far ahead of spill for later disposal. Do not get water inside container. Isolate area until gas has dispersed (DOT 1984, Guide 15).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material,

SULFUR TETRAFLUORIDE

SECTION IX (continued)

immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 15).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ANTIMONY PENTAFLUORIDE

CAS Registry Number: 7783-70-2

Synonyms: Antimony Fluoride; Antimony (V) Fluoride; Antimony (V) Pentafluoride; Pentafluoroantimony

Chemical Formula: SbF_5

Molecular Weight: 216.76

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.27 mg/L (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Antimony Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 286°F, 141°C (*Merck 1976)

Specific Gravity (H_2O=1): 3.097 at 25.8°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: 47°F, 8.3°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble (*Weast 1979)

ANTIMONY PENTAFLUORIDE

SECTION II (continued)

Appearance and Odor: Oily, colorless liquid (*NFPA 1978); sharp odor (*CHRIS 1978).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Antimony and compounds) TWA 0.5 mg/m^3, as antimony (NIOSH 1987, p. 52)

ACGIH TLV: (Antimony and compounds) TWA 0.5 mg/m^3, as antimony (ACGIH 1986-87, p. 10)

IDLH: Not Found

Other Limits Recommended: IDLH for Antimony and Compounds: 80 mg/m^3 (NIOSH/OSHA 1978, p. 48). (Antimony and compounds) NIOSH: 0.5 mg/m^3 10-hour TWA (NIOSH 1987, p. 52).

Routes of Entry: **Inhalation:** Yes (Weiss 1980, p. 121)
Skin: Yes (*NFPA 1975)
Ingestion: Yes (Gosselin 1984, p. II-133)

Health Hazards (Acute, Delayed, and Chronic): The compound is irritating to eyes, skin, and lungs (*NFPA 1975). Contact with eyes or skin causes severe burns (*CHRIS 1978). The compound is extremely toxic with a probable oral lethal dose of 5-50 mg/kg or between 7 drops and teaspoonful for a 150 pound person (antimony salts) (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not flammable (Weiss 1980, p. 121)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Do not use water or foam on fire or on adjacent fires; extinguish with dry chemicals or carbon dioxide (Weiss 1980, p. 121).

Special Fire Fighting Procedures: Wear full protective clothing (*NFPA 1978) and acid-gas-type canister mask (*CHRIS 1978). Move container from fire area. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 59). Reacts violently with water (*Merck 1976).

ANTIMONY PENTAFLUORIDE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Reacts violently with water (*Merck 1976) to form poisonous hydrogen fluoride fumes. If confined and wet can cause explosion. May cause fire in contact with combustible material (Weiss 1980, p. 121).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 121)

Conditions to Avoid: If confined and wet, can cause explosion. May cause fire in contact with combustible material (Weiss 1980, p. 121).

Incompatibility (Materials to Avoid): Reacts violently with water (*Merck 1976).

Hazardous Decomposition or Byproducts: When heated with water, it emits poisonous hydrogen fluoride fumes (Weiss 1980, p. 121).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 121)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Fluorination of organic compounds (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Flood spills with large volumes of water (*NFPA 1978). Reacts violently with water (*Merck 1976). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Absorb spills with noncombustible absorbent material. For large spills dike far ahead (DOT 1984, Guide 59).

ANTIMONY PENTAFLUORIDE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Viton	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Ingestion causes vomiting and severe burns of mouth and throat. Overexposure by any route can cause bloody stools, slow pulse, low blood pressure, coma, convulsions, and cardiac arrest (*CHRIS 1978).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration; if difficult breathing, give oxygen. In case of contact with material, immediately flush with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Effects may be delayed; keep victim under observation (DOT 1984, Guide 59).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TELLURIUM HEXAFLUORIDE

CAS Registry Number: 7783-80-4

Synonyms: Tellurium Fluoride (TeF6); Tellurium Fluoride (TeF6), (OC-6-11)-

Chemical Formula: TeF_6

Molecular Weight: 241.61

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rabbit, guinea pig) 0.049 mg/liter/8 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 95.91°F, 35.5°C (*Weast 1979)

Specific Gravity (H_2O=1): 2.499 at -10°C (*Merck 1976)

Vapor Pressure (mmHg): Greater than 760 (NIOSH/OSHA 1978, p. 172)

Melting Point: -35.7°F, -37.6°C (*Merck 1976)

Vapor Density (AIR=1): Greater than 1 (NIOSH/OSHA 1978, p. 172)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes (Weast 1979, p. B-132)

Appearance and Odor: Colorless gas; repulsive odor (*Merck 1976).

TELLURIUM HEXAFLUORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.02 ppm (0.2 mg/m^3), as tellurium (NIOSH 1987, p. 216)

ACGIH TLV: TWA 0.02 ppm (0.2 mg/m^3), as tellurium (*ACGIH 1980)

IDLH: 1 ppm (NIOSH/OSHA 1978, p. 172)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1979)
Skin: Yes (*Sax 1979)
Ingestion: Yes (*Sax 1979)

Health Hazards (Acute, Delayed, and Chronic): Capable of causing death or permanent injury. Acute -- the material is highly toxic by inhalation exposure and a strong irritant to skin, eyes, the lungs, the throat, and stomach (*Sax 1979). Death can occur from filling of the lungs with fluid (pulmonary edema) or from asphyxiation due to spasm of the throat (larynx) or bronchi (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Those with impaired pulmonary function, especially obstructive airway diseases are at a greater risk (*NIOSH/OSHA 1981).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material is not combustible (NIOSH/OSHA 1978, p. 172). Small fires: dry chemical or carbon dioxide. Large fires: water spray, fog or foam (DOT 1984, Guide 15).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and full protective clothing. Do not get water inside container. Move container from fire area if you can do so without risk. Stay away from ends of tanks. Spray cooling water on containers that are exposed to flames until well after fire is out. Isolate area until gas has dispersed (DOT 1984, Guide 15).

Unusual Fire and Explosion Hazards: Container may explode in heat of fire (DOT 1984, Guide 15). When heated to decomposition, it emits very toxic fumes of fluoride and tellurium (Sax 1984, p. 2502).

NFPA Flammability Rating: Not Found

TELLURIUM HEXAFLUORIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposes in water, acid, and alkali (*Weast 1979).

Incompatibility (Materials to Avoid): None hazardous (NIOSH/OSHA 1978, p. 172).

Hazardous Decomposition or Byproducts: Toxic gases and vapors such as hydrogen fluoride may be released when tellurium hexafluoride decomposes (*NIOSH/OSHA 1981). When decomposed, toxic fumes of fluoride and tellurium are released (Sax 1984, p. 2502).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of leak to disperse vapors. Stop the flow of the leak. Remove the leaking container to a safe place in the open air and allow the leak to disperse (*NIOSH/OSHA 1981). Use water spray to reduce vapor but do not put water on leak or spill area. Small spills: flush area with flooding amounts of water. Large spills: dike far ahead of spill for later disposal. Do not get water inside container. Isolate area until gas has dispersed (DOT 1984, Guide 15).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

TELLURIUM HEXAFLUORIDE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TELLURIUM HEXAFLUORIDE

(7783-80-4)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless gas.

Odor - Garliclike, repulsive.

Material to Avoid - Water (except for use in emergency life support).

Caution: *Avoid sources of heat including fire; hydrogen fluoride and tellurium fumes will be liberated when heated to decomposition. Tellurium hexafluoride will emit toxic fumes of hydrogen fluoride gas upon decomposition in water.*

Other Name - Tellurium fluoride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Tellurium Hexafluoride Exposure:

Signs and symptoms of acute exposure to tellurium hexafluoride may include drowsiness, malaise, lassitude, weakness, and dizziness. A metallic taste, garlicky breath, and profuse sweating may be noted. Kidney damage, liver injury, and pulmonary effects such as pulmonary edema and bronchial spasms may also occur. Gastrointestinal effects may include nausea, vomiting, anorexia, and constipation. Dermal exposure may result in dermatitis (red, inflamed skin).

TELLURIUM HEXAFLUORIDE

Emergency Life-Support Procedures:

Acute exposure to tellurium hexafluoride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to tellurium hexafluoride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to tellurium hexafluoride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

TELLURIUM HEXAFLUORIDE

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. Humidified oxygen is preferred.

2. IMMEDIATELY give the victims milk or water to dilute the hydrofluoric acid: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Milk or water should be given only if victims are conscious and alert.

3. DO NOT induce vomiting.

4. Milk of Magnesia should be administered if victims are conscious and alert. Use 2.5 mL (1/2 tsp) for children up to 1 year old, 5 mL (1 tsp) for children 1 to 12 years old, and 10 mL (2 tsp) for adults. Do not exceed 15 mL (3 tsp or 1 tbsp).

5. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

6. Activated charcoal is of no value.

7. Repeat the administration of water or milk to conscious and alert victims. Use quantities listed above (see No. 2).

8. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ARSENOUS TRICHLORIDE

CAS Registry Number: 7784-34-1

Synonyms: Arsenic Trichloride; Arsenic Butter; Arsenic Chloride; Arsenic (III) Chloride; Arsenic (III) Trichloride; Arsenious Chloride; Arsenous Chloride; Butter of Arsenic; Caustic Arsenic Chloride; Caustic Oil of Arsenic; Fuming Liquid Arsenic; Trichloroarsine

Chemical Formula: $AsCl_3$

Molecular Weight: 181.28

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (cat) 0.1 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 5000 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 266.38°F, 130.21°C (*Merck 1983)

Specific Gravity (H_2O=1): 2.1497 at 25°C/4°C (*Merck 1983)

Vapor Pressure (mmHg): 10 at 23.5°C (*Patty 1963)

Melting Point: 3.2°F, -16°C (*Merck 1983)

Vapor Density (AIR=1): 6.25 (*Clayton and Clayton 1981-82)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: One mole in 9 moles (*Merck 1983)

ARSENOUS TRICHLORIDE

SECTION II (continued)

Appearance and Odor: Yellowish oily liquid or needle-shaped crystals (*Patty 1963); acrid odor (*CHRIS 1978).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p. 54)

ACGIH TLV: (Arsenic and soluble compounds) TWA 0.2 mg/m^3, as arsenic (ACGIH 1986-87, p. 10)

IDLH: Not Found

Other Limits Recommended: (Arsenic and compounds) NIOSH: 0.002 mg/m^3 15-minute ceiling (NIOSH 1987, p. 54). (Arsenic and compounds) NIOSH occupational carcinogen (NIOSH 1987, p. 54).

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (Gosselin 1984, p. III-42)
Ingestion: Yes (Gosselin 1984, p. III-42)

Health Hazards (Acute, Delayed, and Chronic): It can cause death. In acute exposures, it is extremely toxic and caustic, owing not only to the poisonous nature of arsenic, but also to the release of hydrochloric acid in the presence of water (*Grant 1974). Exposure to the skin causes local irritation and blisters. Inhalation or ingestion causes hemorrhagic gastroenteritis resulting in loss of fluids and electrolytes, collapse, shock and death (Gosselin 1984, p. III-42). Chronic poisoning can lead to peripheral nerve damage, skin conditions, liver damage (*Sax 1975, *Merck 1976); and it has been implicated in the induction of skin and lung cancer (Gosselin 1984, p. III-42, Gilman 1980). The fatal human dose is 70-180 mg depending on the weight of the victim (Weiss 1980, p. 128).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is not flammable (*NFPA 1978). Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike

ARSENOUS TRICHLORIDE

SECTION IV (continued)

fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When in contact with active metals such as arsenic, iron, aluminum, zinc, or when heated to decomposition, it emits highly toxic fumes of arsenic (*Sax 1975). Upon contact with water hydrogen chloride is produced (*NFPA 1978). Water causes it to decompose to yield arsenic acid and hydrochloric acid (Student 1981, p. 49).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Weiss 1980, p. 128)

Conditions to Avoid: Air, ultraviolet light (*Hawley 1981)

Incompatibility (Materials to Avoid): Active metals such as arsenic, iron, aluminum, zinc (*Sax 1975); decomposed by water to form arsenic hydroxide and hydrogen chloride (Merck 1983, p. 117).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of arsenic. Contact with water produces hydrogen chloride (*Sax 1975).

Hazardous Polymerization: **May Occur:**
May Not Occur: Yes (Weiss 1980, p. 128)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Ceramics industry; synthesis of chlorine - containing arsenicals (*Merck 1983); chemical intermediate for arsenic insecticides and arsenic pharmaceuticals (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

ARSENOUS TRICHLORIDE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED
Viton/Neoprene	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ARSENOUS TRICHLORIDE

(7784-34-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Pale yellow, oily liquid or needle-shaped crystals below 16 degrees C (3 degrees F).

Odor - Sharp, biting.

Commercial Form - Liquid in glass bottles or 20- and 55-gallon drums.

Uses - Ceramic production, chemical intermediate for pesticides and pharmaceuticals.

Materials to Avoid - Water (except for use in emergency life support).

Caution: *Contact with water will result in the formation of toxic hydrogen chloride gas.*

Other Names - Arsenic chloride, arsenious chloride, arsenous chloride, butter of arsenic, caustic arsenic chloride, fuming liquid arsenic, trichloroarsine.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, KCl, dopamine, norepinephrine, sodium bicarbonate, dimercaprol, penicillamine.

ARSENOUS TRICHLORIDE

Signs and Symptoms of Acute Arsenous Trichloride Exposure:

Warning: *Effects usually appear within 30 minutes of exposure but may be delayed for several hours. Caution is advised.*

Dehydration, intense thirst, vomiting, severe abdominal pain, and diarrhea are among the first signs and symptoms of acute arsenous trichloride exposure. Hypotension (low blood pressure) and tachycardia (rapid heart rate) are common. Headache, conjunctivitis (red, inflamed eyes), runny nose, and lacrimation (tearing) may also be seen. Garlic odor to the breath and feces may be noted.

Cardiovascular signs include shock, ventricular fibrillation, tachycardia, and other cardiac abnormalities. Pulmonary edema may occur. Altered mental status, seizures, and delirium are further complications of acute arsenous trichloride exposure. Intense muscular cramping is common. Contact with airborne dust can result in the release of hydrochloric acid and is generally accompanied by irritation of exposed skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to arsenous trichloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to arsenous trichloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

ARSENOUS TRICHLORIDE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to arsenous trichloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. DO NOT induce vomiting.

4. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

ARSENOUS TRICHLORIDE

6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ARSINE

CAS Registry Number: 7784-42-1

Synonyms: Arsenic Hydride; Arsenic Trihydride; Arseniuretted Hydrogen; Arsenous Hydride; Hydrogen Arsenide

Chemical Formula: AsH_3

Molecular Weight: 77.93

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse) 0.07 mg/liter/3 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -80.4°F, -62.5°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.689 at 185°F, 84.9°C (liquid) (*Weast 1979) (Patty, 1981, p. 1520)

Vapor Pressure (mmHg): Greater than 1 atm (NIOSH/OSHA 1978, p. 48)

Melting Point: -179°F, -117°C (*Merck 1983)

Vapor Density (AIR=1): 2.66 (*Sax 1986), 2.695 (Weast 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 20 ml/100 ml at 68°F, 20°C (*Clayton and Clayton 1981-1982)

Appearance and Odor: Colorless gas; disagreeable garlic odor (*Merck 1983).

ARSINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.05 ppm, (0.2 mg/m^3) (NIOSH 1987, p. 54)

ACGIH TLV: TWA 0.05 ppm, (0.2 mg/m^3) (*ACGIH 1983)

IDLH: 6 ppm (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: NIOSH: 0.002 mg/m^3 15-minute ceiling (NIOSH 1987, p. 54). NIOSH occupational carcinogen (NIOSH 1987, p. 54). EEGL 1.0 ppm (60 minutes) (NRC 1984a, pp. 35-40)

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by inhalation; a very short exposure to small quantities may cause death or permanent injury (Sax 1984, p. 323). Arsine is the most powerful hemolytic poison encountered in industry (*Hamilton 1974).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Extremely flammable; may be ignited by heat, sparks, or flames (*DOT 1984)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Let small fires burn. Use water spray, fog, or foam for large fires. For massive fire in cargo area use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn (*DOT 1984).

Special Fire Fighting Procedures: Cool containers that are exposed to flames with water from the side until well after fire is out. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (*DOT 1984).

Unusual Fire and Explosion Hazards: Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire (*DOT 1984). When heated to decomposition, emits highly toxic fumes (*Sax 1979).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Merck 1983)
Stable:

Conditions to Avoid: On exposure to light, moist arsine decomposes

ARSINE

SECTION V (continued)

quickly, depositing shiny black arsenic (*Merck 1983).

Incompatibility (Materials to Avoid): Can react vigorously with oxidizing materials. May explode when exposed to chlorine, nitric acid, or potassium plus ammonia (Sax 1984, p. 324; NIOSH/OSHA 1978, p. 48).

Hazardous Decomposition or Byproducts: When heated to decomposition, emits highly toxic fumes (Sax 1984, p. 324).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used in the manufacture of electronic components. It may be used in organic synthesis and as a poison gas for military purposes (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

No flares, smoking, or flames in area. Use water spray to reduce vapors. Isolate area until arsine gas has dispersed. Stay upwind; keep out of low areas (*DOT 1984). There is a high potential for generation of arsine gas when inorganic arsenic is exposed to freshly-formed molecular hydrogen (*Blackwell 1979).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

ARSINE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide
for
ARSINE

(7784-42-1)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless gas.

Odor - Disagreeable, garliclike.

Commercial Form - 99% pure or in mixture with other gases in steel cylinders.

Uses - Organic synthesis, manufacture of semi-conductors, chemical warfare agent.

Materials to Avoid - Oxidizers, water (except for use in emergency life support).

Caution: *Extremely flammable. Avoid sources of ignition.*

Other Names - Arsenic hydride, arsenic trihydride, arseniuretted hydrogen, arsenous hydride, hydrogen arsenide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, water, normal saline, D5W, Ringer's lactate, dopamine, dimercaprol (BAL).

ARSINE

Signs and Symptoms of Acute Arsine Exposure:

Warning: *Effects usually appear within 30 to 60 minutes, but may be delayed for several hours. Caution is advised.*

Note: Arsine is the most powerful hemolytic poison encountered in industry.

Acute arsine exposure may be fatal. Headache and a garlicky odor of the breath may be the first signs and symptoms noted following acute exposure to arsine. Victims may experience hypotension (low blood pressure), generalized weakness, and muscle cramping. Gastrointestinal effects include nausea, vomiting, anorexia, and abdominal pain. Urine may be colored red or green, and the volume may be reduced. Arsine is corrosive to the skin, eyes, and mucous membranes. Severe exposure may result in cardiac abnormalities.

Emergency Life-Support Procedures:

Acute exposure to arsine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Victims must be transported to a health care facility as quickly as possible. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to arsine.

2. RUSH to a health care facility!

3. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to arsine.

ARSINE

2. RUSH to a health care facility!

3. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

4. Remove contaminated clothing as soon as possible.

5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

6. THOROUGHLY wash exposed skin areas with water.

7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM ARSENITE

CAS Registry Number: 7784-46-5

Synonyms: Arsenenous Acid, Sodium Salt; Arsenious Acid, Monosodium Salt; Atlas 'A'; Chem Pels C; Chem-Sen 56; Kill-All; Penite; Prodalumnol; Prodalumnol Double; Sodium Metaarsenite; Arsenious Acid, Sodium Salt

Chemical Formula: $NaAsO_2$ (Merck 1983, p. 1230)

Molecular Weight: 129.91 (Sax 1984, p. 2412)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mammal) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1000 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.87 (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble (*Merck 1983).

Appearance and Odor: White or grayish-white powder (*Merck 1983) with a salty taste (*White-Stevens 1971)

SODIUM ARSENITE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and soluble compounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p. 54)

ACGIH TLV: (Arsenic and soluble compounds) TWA 0.2 mg/m^3, as arsenic (ACGIH 1985, p. 10)

IDLH: Not Found

Other Limits Recommended: (Arsenic and soluble compounds) NIOSH: 0.002 mg/m^3, 15-minute ceiling, as arsenic (NIOSH 1987, p. 54); (Arsenic and soluble compounds) NIOSH occupational carcinogen (NIOSH 1987, p. 54)

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (Sax 1984, p. 2412)
Ingestion: Yes (Sax 1984, p. 2412)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic: probable oral lethal dose (human) 5-50 mg/kg, between 7 drops and one teaspoon for 70 kg person (150 lb.) (*Gosselin 1976). Poisonous if swallowed or inhaled (*DOT 1984). Human suspected carcinogen (Sax 1984, p. 2412).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Keep unnecessary people away; stay upwind; keep out of low areas. Wear self-contained breathing apparatus and full protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: This material may burn but does not ignite readily (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Slowly converted in solution to arsenates by atmospheric oxygen; in dry state it is decomposed by carbon dioxide (*IARC 1972-1985).

SODIUM ARSENITE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated it emits toxic fumes of arsenic and sodium oxide (Sax 1984, p. 2412).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Technical grade is 90-95% pure (Merck 1983, p. 1230). Commercially 95-98 percent pure (Sax 1984, p. 2412). The material is used in manufacturing of arsenical soap for use on skin; treating vines against certain scale diseases (Merck 1983, p. 1230); wood preservation (*IARC 1972-1985); reagent in preparation of methylene iodide; corrosion inhibitor (*SRI); and herbicidal and pesticidal purposes (*IARC 1972-1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do so without risk. Absorb small spills 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 spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SODIUM ARSENITE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for SODIUM ARSENITE

(7784-46-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White to gray powder.

Odor - None.

Commercial Forms - 95 to 98% pure powder; 4, 6, 8, or 9.5% pure solution.

Uses - Herbicide, acaricide, corrosion inhibitor, textile drying, manufacture of arsenical soaps and wood preservatives.

Caution: *Avoid sources of heat including fire. Sodium arsenite will emit toxic arsenic fumes when heated to decomposition.*

Other Names - Arseneous acid, sodium salt; Atlas 'A'; Penite; Prodalumnol; Sodanit; sodium meta-arsenite.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, dimercaprol (BAL), penicillamine, morphine.

SODIUM ARSENITE

Signs and Symptoms of Acute Sodium Arsenite Exposure:

Warning: *Effects may be delayed for several hours. Caution is advised.*

Signs and symptoms of acute exposure to sodium arsenite may be severe and include cough, dyspnea (shortness of breath), hypotension (low blood pressure), and chest pain. Gastrointestinal effects include difficulty swallowing, intense thirst, generalized abdominal pain, vomiting, and painful diarrhea; blood may be noted in the vomitus and feces. A weak pulse, cyanosis (blue tint to the skin and mucous membranes), and cold extremities may also be observed. Neurological effects include giddiness, delirium, mania, stupor, weakness, headache, dizziness, and fainting. Convulsions, paralysis, and coma may occur. Sodium arsenite may irritate or burn the skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to sodium arsenite may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to sodium arsenite.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to sodium arsenite.

SODIUM ARSENITE

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. THOROUGHLY wash exposed skin areas with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MEVINPHOS

CAS Registry Number: 7786-34-7

Synonyms: Crotonic Acid, 3-Hydroxy-, Methyl Ester, Dimethyl Phosphate, (E)-; Apavinphos; 1-Methoxycarbonyl-1-propen-2-yl Dimethyl Phosphate; 2-Butenoic Acid, 3-((Dimethoxyphosphinyl)oxy)-, Methyl Ester; 2-Carbomethoxy-1-Methylvinyl Dimethyl Phosphate; 1-Carbomethoxy-1-Propen-2-yl Dimethyl Phosphate; 2-Methoxycarbonyl-1-Methylvinyl Dimethyl Phosphate; 3-Hydroxycrotonic Acid Methyl Ester Dimethyl Phosphate; 3-[(Dimethoxyphosphinyl)oxy]-2-Butenoic Acid Methyl Ester; Alpha-2-Carbomethoxy-1-Methylvinyl Dimethyl Phosphate; Cis-2-Methoxycarbonyl-1-Methylvinyl Dimethylphosphate; Cis-Phosdrin; CMDP; Compound 2046; Crotonic Acid, 3-Hydroxy-, Methyl Ester, Dimethyl Phosphate; Dimethyl (1-Methoxycarboxypropen-2-yl) Phosphate; Dimethyl 2-Methoxycarbonyl-1-Methylvinyl Phosphate; Dimethyl Methoxycarbonylpropenyl Phosphate; Dimethyl Phosphate of Methyl 3-Hydroxy-cis-Crotonate; Dimethyl-1-Carbomethoxy-1-Propen-2-yl Phosphate; Duraphos; ENT 22,374; ENT 22374; Fosdrin; Gesfid; Gestid; Meniphos; Menite; Methyl 3-(Dimethoxyphosphinyloxy)Crotonate; O,O-Dimethyl 1-Carbomethoxy-1-Propen-2-yl Phosphate; O,O-Dimethyl O-(1-Methyl-2-Carboxyvinyl) Phosphate; OS-2046; PD 5; Phosdrin; Phosfene; Phosphoric Acid, (1-Methoxycarboxypropen-2-yl) Dimethyl Ester; Phosphoric Acid, Dimethyl Ester, Ester With Methyl 3-Hydroxycrotonate

Chemical Formula: $C_7H_{13}O_6P$

Molecular Weight: 224.17

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.128 mg/liter/hour (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 223-226°F, 106-107.5°C at 1 mmHg (*Merck 1983)

MEVINPHOS

SECTION II (continued)

Specific Gravity (H_2O=1): 1.25 at 20°C (*Merck 1983)

Vapor Pressure (mmHg): 0.0029 at 70°F (*Spencer 1982)

Melting Point: cis isomer 70°F, 21°C; trans isomer 44.4°F, 6.9°C (Hayes 1982, p. 356; *Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Merck 1983)

Appearance and Odor: Pale yellow to orange liquid (*Spencer 1982), with a weak odor (NIOSH/OSHA 1978, p. 154)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.1 mg/m^3 (NIOSH/OSHA 1978, p. 154)

ACGIH TLV: TWA 0.01 ppm (0.1 mg/m^3) (skin); STEL 0.03 ppm (0.3 mg/m^3) (skin) (ACGIH 1986-87)

IDLH: 40 mg/m^3 (NIOSH/OSHA 1978, p. 154)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Gosselin 1984)
Skin: Yes (*Gosselin 1984)
Ingestion: Yes (*Gosselin 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is super toxic; the probable oral lethal dose for humans is less than 5 mg/kg, or a taste (less than 7 drops) for a 150-lb. person. It has direct and immediate effects whether it is swallowed, inhaled, or absorbed through the skin (*Gosselin 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 175°F (OC) (*Clayton and Clayton 1981-82)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: use dry chemical, carbon dioxide, water spray or foam. Large fires: use water spray, fog or foam. Fight fire from maximum distance. Dike fire control water for later disposal (*DOT 1984).

MEVINPHOS

SECTION IV (continued)

Special Fire Fighting Procedures: Isolate hazard area, stay upwind; ventilate closed spaces before entering, wear protective clothing and positive breathing apparatus. Remove and isolate contaminated clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases. Runoff from fire control may give off poisonous gases and also cause pollution (*DOT 1984).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Spencer 1982)

Conditions to Avoid: Temperatures above 25-30°C, sources of heat, fire, free flames or spark-generating equipment (*Farm Chemicals Handbook, 1984)

Incompatibility (Materials to Avoid): Strong oxidizers (*NIOSH/OSHA 1978)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of phosphorus oxides (Sax 1984, p. 639)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as an insecticide and acaricide on vegetables, alfalfa, deciduous fruits and nuts (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material (see Section III above). In case of spills, stay upwind; keep out of low areas. Ventilate closed areas before entering them. Use water spray to reduce vapors (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

MEVINPHOS

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, dizziness, runny nose, tightness in the chest, blurring and dimming of vision, slurrying of speech, twitching of muscles, mental confusion, disorientation, difficulty breathing, bluing of skin, convulsions, coma, and death (*Gosselin 1984)

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THALLOUS CHLORIDE

CAS Registry Number: 7791-12-0

Synonyms: Thallium Chloride; Thallium Chloride (TlCl); Thallium Monochloride; Thallium (1+) Chloride; Thallium (I) Chloride

Chemical Formula: TlCl

Molecular Weight: 239.82

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 24 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): In Thallium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 1328°F, 720°C (*Weast 1979)

Specific Gravity (H_2O=1): 7.0 (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: 806°F, 430°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in 260 parts cold water (*Merck 1976)

Appearance and Odor: White, crystalline powder (*Merck 1976); becomes violet on exposure to light (*Hawley 1977).

THALLOUS CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Soluble Thallium Compounds), 0.1 mg/m^3, as Thallium (skin) (OSHA 1984, p. 663)

ACGIH TLV: (Soluble Thallium Compounds), TWA 0.1 mg/m^3, as Thallium (skin) (ACGIH 1986-87, p. 31)

IDLH: Not Found

Other Limits Recommended: IDLH for soluble thallium compounds 20 mg/m^3, as thallium (NIOSH 1987, p. 224). Occupational exposure to thallium compounds recommended standard 20 mg/m^3 (NIOSH/OSHA 1978, p. 178).

Routes of Entry: **Inhalation:** Yes (*Venugopal 1978)
Skin: Yes (*Venugopal 1978)
Ingestion: Yes (*Venugopal 1978)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Thallium Salts) Poisonous if swallowed. Inhalation of dust is poisonous (DOT 1984, Guide 53).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Thallium Salts) Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Thallium Salts) Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: (Non-Specific -- Thallium Salts) Fire may produce irritating or poisonous gases (DOT 1984, Guide 53). When heated to decomposition, it emits very toxic fumes of chloride and thallium (Sax 1984, p. 2556).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

THALLOUS CHLORIDE

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Thallium(I) chloride is vigorously attacked by cold fluorine (*Bretherick 1979). A mixture of potassium and thallous chloride produces a weak explosion on impact (*NFPA 1978).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a catalyst in chlorinations (*Merck 1976) and in suntan lamps (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above). (Non-Specific -- Thallium Salts) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb with sand or other non-combustible 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

THALLOUS CHLORIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for THALLOUS CHLORIDE

(7791-12-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White to violet crystalline powder.

Commercial Form - Powder in glass bottles.

Uses - Suntan lamps, catalyst.

Other Names - Thallium chloride, thallium monochloride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Thallous Chloride Exposure:

Warning: *Effects may be delayed from hours to days. Caution is advised.*

Signs and symptoms of acute exposure to thallous chloride may be severe and include bronchitis, pneumonia, and respiratory paralysis. Tachycardia (rapid heart rate) may occur. Victims may experience headache, delerium, dementia, depression, psychosis, and peripheral burning sensations with severe pain. Muscle weakness and atrophy, incoordination, choreiform (spasmodic) movements, convulsions, shock, and coma may also occur. Hair loss is common. Gastrointestinal effects include increased salivation, inflammation of the oral cavity, anorexia, vomiting (may be bloody), diarrhea (may be bloody), abdominal pain, and constipation. Kidney damage has been reported.

THALLOUS CHLORIDE

Emergency Life-Support Procedures:

Acute exposure to thallous chloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to thallous chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to thallous chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. THOROUGHLY wash exposed skin areas with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

THALLOUS CHLORIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of thallous chloride is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of thallous chloride may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SELENIUM OXYCHLORIDE

CAS Registry Number: 7791-23-3

Synonyms: Seleninyl Chloride; Seleninyl dichloride; Selenium chloride oxide; Selenium oxydichloride

Chemical Formula: $SeOCl_2$

Molecular Weight: 165.87

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} skin (rabbit) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Selenium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 356°F, 180°C (*Merck 1976)

Specific Gravity (H_2O=1): 2.44 at 16°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 1 at 94.6°F, 34.8°C (*Sax 1979)

Melting Point: 47.3°F, 8.5°C (*Weast 1979)

Vapor Density (AIR=1): Not found

Evaporation Rate (Butyl acetate=1): Not found

Solubility in Water: Decomposed by water into hydrochloric acid and selenious acid (*Merck 1976).

Appearance and Odor: Nearly colorless or yellowish liquid (*Merck 1976).

SELENIUM OXYCHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Selenium compounds) TWA 0.2 mg/m^3, as Selenium (NIOSH 1987, p. 206)

ACGIH TLV: (Selenium compounds) TWA 0.2 mg/m^3, as Selenium (ACGIH 1986-87, p. 29)

IDLH: (Selenium compounds) 100 mg/m^3, as Selenium (NIOSH 1987, p. 206)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is very toxic and may cause death or permanent injury after very short exposures to small quantities (*Sax 1975). Inhalation of small quantities may be corrosive and irritating to the respiratory tract (*Patty 1963). It can burn and irritate the skin and eyes and cause burns when ingested (*Rumack 1975 to Present). Long-term exposure to selenium compounds may be a cause of amyotrophic lateral sclerosis in humans (Sax 1984, pp. 2391-92).

Medical Conditions Generally Aggravated by Exposure: Populations at special risk include those with a history of dermatitis, chronic bronchitis, skin allergies, respiratory tract infections, liver or kidney disease, jaundice, or albuminuria. Women of child-bearing age are also considered at risk (*Friberg 1979).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use dry chemical, carbon dioxide, water spray, or foam for small fires; use water spray, fog, or foam for large fires (*DOT 1984).

Special Fire Fighting Procedures: Cool containers that are exposed to flames with water until well after the fire is out. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and special protective clothing (*DOT 1984).

Unusual Fire and Explosion Hazards: When this material is heated to decomposition, or in contact with acids or acid fumes, highly toxic chloride and selenium fumes are evolved (*Sax 1979).

NFPA Flammability Rating: Not Found

SELENIUM OXYCHLORIDE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Merck 1976)
Stable:

Conditions to Avoid: Water, moist air (*Merck 1976)

Incompatibility (Materials to Avoid): Decomposed by water (*Merck 1976). Reacts violently with powdered antimony, red and white phosphorus, disilver oxide, lead oxides, and potassium (*Bretherick 1979).

Hazardous Decomposition or Byproducts: Hydrochloric acid and selenious acid are produced by reaction with water (*Merck 1976); toxic chloride and selenium fumes are evolved when material is heated to decomposition (*Sax 1975).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a solvent for many substances, including metals (*Merck 1976) and as a chlorinating agent and resin plasticizer (*Patty 1963).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Isolate hazard area. Stay upwind; keep out of low areas. Do not touch spilled material. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

SELENIUM OXYCHLORIDE

SECTION VIII (continued)

**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inhalation of this material may cause garlic breath odor, nausea, vomiting, indigestion, fever, headache, lassitude, irritability, and unstable blood pressure. Eye contact can cause burns or irritation (*Friberg 1979). Ingestion can produce burns to the mouth, esophogus, and stomach. Skin contact may produce severe burns (*Rumack 1975 to Present).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing give artificial respiration. If breathing is difficult give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin and eyes with running water for at least 15 minutes (DOT 1984, Guide 59).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHINE

CAS Registry Number: 7803-51-2

Synonyms: Hydrogen Phosphide; Celphos; Delicia; Detia; Gas-Ex-B; Phosphoretted Hydrogen; Phosphorus Trihydride

Chemical Formula: PH_3

Molecular Weight: 34.00

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.015 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -126°F, -87.7°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.746 at -90°C (*Weast 1979)

Vapor Pressure (mmHg): 760 at -87.5°C (Weast 1979, p. D-201)

Melting Point: -207°F, -133°C (*Merck 1983)

Vapor Density (AIR=1): 1.17 (*NFPA 1978)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (*Merck 1983); 26cc/100mL at 17°C (Farm Chemicals Handbook 1984, p. C-47)

Appearance and Odor: Colorless gas or liquid (*Weast 1979) with a disagreeable, fishy odor (*Grant 1974); a colorless gas with a disagreeable garlic-like odor (Student 1981, p. 405)

PHOSPHINE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.3 ppm (0.4 mg/m^3) (NIOSH/OSHA 1978, p. 154)

ACGIH TLV: TWA 0.3 ppm (0.4 mg/m^3) (ACGIH 1983, p. 29); STEL 1 ppm (1 mg/m^3) (*ACGIH 1983)

IDLH: 200 ppm (NIOSH/OSHA 1978, p. 154)

Other Limits Recommended: Allowable tolerance for residues in agricultural commodities: 0.01 ppm (*USEPA 1983). Maximum Air Concentration (USSR) 0.1 mg/m^3 (Encyc Occupat Health and Safety 1983, p. 1681).

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 154)
Skin: No (*Rumack 1975 to Present)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Phosphine is a super- toxic gas with a probable oral lethal dose of 5 mg/kg or 7 drops for a 150 pound person (*Gosselin 1976). An air concentration of 3 ppm is safe for long term exposure, 500 ppm is lethal in 30 minutes, and a concentration of 1,000 ppm is lethal after a few breaths (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Dangerous fire hazard from spontaneous chemical reaction
LEL: 1.79% (*Spencer 1982)
UEL: Not Found

Extinguishing Methods: If material is on fire or involved in a fire, do not extinguish unless flow can be stopped; use water in flooding quantities as fog; cool all affected containers with flooding quantities of water; apply water from as far a distance as possible; solid streams of water may be ineffective; use "alcohol" foam, carbon dioxide or dry chemical (Student 1981, p. 405).

Special Fire Fighting Procedures: Wear full protective clothing including self-contained breathing apparatus, rubber gloves, boots, and bands around legs, arms, and waist. No skin surface should be exposed (*NFPA 1978). For massive fires in cargo areas, use unmanned hose holders or monitor nozzles. Move containers from fire area (DOT 1984, Guide 18).

Unusual Fire and Explosion Hazards: Phosphine can explode with powerful oxidizers (Sax 1986, p. 138). The gas is heavier than air and may travel along the ground to an ignition source (DASE 1980, p. 741).
Container may explode in heat of fire (DOT 1984, Guide 18).

NFPA Flammability Rating: 4

PHOSPHINE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, up to 55°C (*Spencer 1982)

Conditions to Avoid: May become unstable at high temperatures (*NFPA 1978). Reacts violently with air (Sax 1984, p. 2212).

Incompatibility (Materials to Avoid): Reacts violently with: air; boron trichloride; bromine; chlorine; chlorine monoxide; nitric acid; nitric oxide; nitrous oxide; nitrogen trioxide; silver nitrate; nitrous acid; mercuric nitrate; nitrogen trichloride; oxygen; and (potassium plus ammonia) (Sax 1984, p. 2212).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of phosphorus oxides (Sax 1984, p. 2212).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide used for fumigation of animal feed, leaf stored tobacco, and box cars; also used for rodent control (*Spencer 1982). Doping agent for solid state electronic components; polymerization initiator, condensation catalyst (*SRI). Aluminum phosphine and magnesium phosphide are registered as pesticides in the U.S.; they produce phosphine (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate area and deny entry. Stay upwind and keep out of low areas. Ventilate closed spaces. Isolate hazard area for one-half mile in all directions if tank car or truck is involved in fire. Use water spray to reduce vapors; isolate area until gas has dispersed. Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do so without risk (DOT 1984, Guide 18).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PHOSPHINE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Neoprene	POOR/MANY
PE	POOR/LIMITED
PVC	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHOSPHINE

(7803-51-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Colorless gas or liquid under pressure.

Odor - Fishy or garliclike.

Commercial Form - Gas.

Uses - Chemical intermediate, polymerization initiator, condensation catalyst, doping agent, pesticide, fumigant.

Material to Avoid - Oxygen (except for use in emergency life support).

Caution: *Highly flammable. May spontaneously ignite in air or explode when mixed with oxygen. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names - Celphos, Delicia, Detia, hydrogen phosphide, phosphoretted hydrogen, phosphorus trihydride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate, diazepam, phenytoin.

Signs and Symptoms of Acute Phosphine Exposure:

Warning: *Effects may be delayed for several hours. Caution is advised.*

Acute exposure to phosphine usually results in headache, cough, tightness and pain in the chest, shortness of breath, dizziness, lethargy, and stupor.

PHOSPHINE

Fatigue, muscle pain, chills, tremors, incoordination, seizures, and coma may be seen. Pulmonary edema and cardiac arrhythmias are common.

Gastrointestinal symptoms include nausea, vomiting, abdominal pain, and diarrhea. Renal (kidney) damage, hepatic (liver) damage, and jaundice may also occur. Contact with phosphine may burn the skin and eyes.

Emergency Life-Support Procedures:

Acute exposure to phosphine may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phosphine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phosphine.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

PHOSPHINE

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CAMPHECHLOR

CAS Registry Number: 8001-35-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 786) Toxaphene; Agricide Maggot Killer; Alltex; Alltox; Camphochlor; Camphoclor; Camphophene Huileux; Chem-Phene; Chlorinated Camphene; Chlorocamphene; Chlor Chem T-590; Compound 3956; Crestoxo; Cristoxo; Cristoxo 90; ENT 9,735; Estonox; Fasco-terpene; Geniphene; Gy-phene; Hercules 3956; Hercules Toxaphene; Kamfochlor; M 5055; Melipax; Motox; NCI-C00259; Octachlorocamphene; PCC; Phenacide; Phenatox; Polychlorcamphene; Polychlorinated Camphenes; Polychlorocamphene; Strobane-T; Synthetic 3956; Toxadust; Toxakil; Toxon 63; Toxypen; Vertac 90%

Chemical Formula: $C_{10}H_{10}Cl_8$ approximate (Hawley 1981, p. 1034)

Molecular Weight: Unknown

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (dog) 15 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): Yes

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.65 (*Worthing 1976)

Vapor Pressure (mmHg): 0.4 at 25°C (*Sunshine 1969)

Melting Point: 149-194°F, 65-90°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 3 mg/liter at room temperature (*Worthing 1979)

CAMPHECHLOR

SECTION II (continued)

Appearance and Odor: Yellow, waxy solid with a pleasant piney odor (*Merck 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.5 mg/m^3 (NIOSH 1987, p. 74)

ACGIH TLV: TWA 0.5 mg/m^3; STEL 1 mg/m^3 (skin) (ACGIH, 1986-87, p. 12)

IDLH: 200 mg/m^3 (NIOSH 1987, P.74)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 63)
Skin: Yes (NIOSH/OSHA 1978, p. 63)
Ingestion: Yes (NIOSH/OSHA 1978, p. 63)

Health Hazards (Acute, Delayed, and Chronic): Camphechlor is extremely toxic: the probable oral lethal dose (human) is 5-50 mg/kg or between 7 drops and 1 teaspoonful for 70 kg (150 lb.) person (*Gosselin 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 84°F, 29°C (CC) (Weiss 1980, p. 874)
Flammable Limits:
LEL: 1.1% (Weiss 1980, p. 874)
UEL: 6.4% (Weiss 1980, p. 874)

Extinguishing Methods: Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55). Water may be ineffective on fire (Weiss 1980, p. 874).

Special Fire Fighting Procedures: Move container from fire area if this can be done without risk. Fight fire from a maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Container may explode in heat of fire (DOT 1984, Guide 55). Toxic vapors are generated when heated (Weiss 1980, p. 874).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Merck 1983)
Stable:

CAMPHECHLOR

SECTION V (continued)

Conditions to Avoid: Dehydrochlorinates in the presence of alkali, on prolonged exposure to sunlight, and at temperatures above 155C (*Merck 1983).

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1984, p. 62); corrosive to iron (Merck 1983, p. 9384).

Hazardous Decomposition or Byproducts: Releases hydrochloric acid in the presence of alkali, on prolonged exposure to sunlight, and at temperatures above 155C (*Merck 1983).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide, primarily for cotton and early growth stages of vegetables (Hawley 1981, p. 1034). Also peas, soybeans, peanut, corn, and wheat. Not produced commercially in the U.S. since 1982 (*SRI). Only registered for scabies control on cattle in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 504; DOT 1984, Guide 55). In case of land spill, dig a pit, pond, lagoon, or holding area to contain the liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or firefighting water. In case of water spill, if camphechlor is dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates (Student 1981, p. 504).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

CAMPHECHLOR

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Acute toxicity is manifested as generalized convulsions preceded by cyanosis. Also reported is sudden exertional dyspnea (labored breathing), tachycardia (rapid heart rate), weakness and low blood pressure (Gosselin 1984, p. III-387). Lethal doses cause respiratory failure. Hypersalivation, leg and back muscle spasms, nausea, vomiting, hyperexcitability, tremors, shivering, clonic convulsions, and tetanic muscular contractions of all skeletal muscles have also been reported (Weiss 1980, p. 874).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DEMETON

CAS Registry Number: 8065-48-3

Synonyms: Phosphorothioic Acid, O,O-Diethyl O-(2-(Ethylthio)Ethyl) Ester Mixed with O,O-Diethyl S-(2-(Ethylthio)Ethyl)Ester (7:3); Systox; O,O-Diethyl O (and S)-2-(Ethylthio)Ethyl Phosphorothioate Mixture; Phosphorothioic acid, O,O-diethyl O-(2-(ethylthio)ethyl) ester, mixed with O,O-diethyl S-(2-(ethylthio)ethyl)phosphorothioate; Isosystox; Thioldemeton; BAY 10756; Bayer 8169; Demeton-O and Demeton-S; Demox; Diethoxythiophosphoric Acid Ester of 2-Ethylmercaptoethanol; E 1059; ENT 17,295; Ethyl Systox; Mercaptofos; Mercaptophos; O,O-Diethyl-2-Ethylmercaptoethyl Thiophosphate; Septox; Systemox; UVL; O,O-Diethyl-O-[2-(ethylmercapto)ethyl]Thionophosphate; Dematon; beta-Ethylmercaptoethyl Diethyl Thionophosphate; Diethoxythiophosphoric Acid Ester of 2-Ethylmercaptoethanol

Chemical Formula: $C_8H_{19}O_3PS_2 \cdot C_8H_{19}O_3PS_2$

Molecular Weight: 258.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 1.7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 273°F, 134°C at 2 mmHg (*Merck 1983)

Specific Gravity (H_2O=1): 1.183 (*Clayton and Clayton 1981-82)

Vapor Pressure (mmHg): 0.00026 (*Hartley 1983)

Melting Point: -13°F, -25°C (NIOSH/OSHA 1978, p. 78)

Vapor Density (AIR=1): Heavier than air (*CHRIS 1978)

DEMETON

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Demeton-O: 60 mg/L; Demeton-S: 2 g/L at room temperature (*Worthing 1983)

Appearance and Odor: Oily liquid (*Merck 1976); amber color (*Osol 1980); sulfur odor (*ACGIH 1980)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 mg/m^3 (skin) (*NIOSH/RTECS 1985)

ACGIH TLV: TWA 0.01 ppm, (0.1 mg/m^3) (skin) (ACGIH 1986-87, p. 15)

IDLH: 20 mg/m^3 (*Encyc Occupat Health and Safety 1983)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (*Sax 1979)
Ingestion: Yes (*Gosselin 1984)

Health Hazards (Acute, Delayed, and Chronic): This material is a cholinesterase inhibitor (*Merck 1983). It is readily absorbed through the skin (*Sax 1979) and is extremely toxic. Probable human lethal oral dose is 5-50 mg/kg or 7 drops to 1 teaspoonful for 150 lb. person (*Gosselin 1984). Acute dose is believed to be 12 to 20 mg by oral route (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 1139°F, 45°C (CC) (solution in combustible solvent) (*CHRIS 1978)
Flammable Limits:
LEL: 1% (solution in combustible solvent) (*CHRIS 1978)
UEL: 5.3% (solution in combustible solvent) (*CHRIS 1978)

Extinguishing Methods: Use dry chemical, foam, carbon dioxide. Water may be ineffective (*CHRIS 1978)

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Flammable Liquid, n.o.s.) Wear positive pressure breathing apparatus and special protective clothing. Move containers from fire area. Dike fire control water for later disposal; do not scatter the material. Cool containers that are exposed to flames with water from the side until well after fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 28).

DEMETON

SECTION IV (continued)

Unusual Fire and Explosion Hazards: May release sulfur oxides and phosphoric acid. Solvent carrier vapors may travel on ground to ignition source (*CHRIS 1978)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*CHRIS 1978)

Conditions to Avoid: Mixtures with water or polar solvents, in which sulfur is lost to oxygen (*White-Stevens 1971); air and light, which cause hydrolysis (*Sunshine 1969); alkaline mixtures and oxidizing agents (*Hartley 1983).

Incompatibility (Materials to Avoid): Strong oxidizers (NIOSH/OSHA 1978, p. 78)

Hazardous Decomposition or Byproducts: When heated, it emits sulfur oxides and phosphoric acid (*CHRIS 1978).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used primarily as an agricultural insecticide (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Spills may be cleaned up by absorbing the material in vermiculite, dry sand, earth, or a similar material (*NIOSH/OSHA 1981). General precautions for organophosphorous pesticides are as follows. Keep unnecessary people away; stay upwind. Shut off ignition sources; no flares, smoking, or flames in hazard area. Do not touch spilled material. Use water spray to reduce vapors. Take up spills with noncombustible absorbent material. For large spills, dike far ahead (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating,

DEMETON

SECTION VIII (continued)

chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DEMETON

(8065-48-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Oily, amber-colored liquid.

Odor - Sulfurlike.

Commercial Form - 25 to 66% demeton in xylene solution.

Use - Pesticide.

Other Names - Bay 10756, E 1059, Ethyl Systox, Mercaptofos, Septox, Systemox.

Note: Demeton is a mixture of phosphorothioic acid, O,O-diethyl O-(2-(ethylthio)ethyl)ester and O,O-diethyl S-(2-(ethylthio)ethyl) ester.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Demeton Exposure:

Warning: *Demeton is readily absorbed through the skin. Effects may be delayed up to 12 hours. Caution is advised.*

Note: Demeton is a cholinesterase inhibitor.

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Acute exposure to demeton may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

The heart rate may decrease following oral exposure or increase following dermal exposure. Chest pain may be noted. Hypotension (low blood pressure) may occur, although hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

Emergency Life-Support Procedures:

Acute exposure to demeton may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as demeton-resistant plastic sheeting and disposable bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to demeton.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to demeton.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

DEMETON

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of demeton is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of demeton may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

DEMETON

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHROMIC CHLORIDE

CAS Registry Number: 10025-73-7

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 922): Chromium(III) Chloride; Chromium Chloride; Chromium Chloride, Anhydrous; Chromium Trichloride; CI 77295; Puratronic Chromium Chloride; Trichlorochromium

Chemical Formula: $CrCl_3$

Molecular Weight: 158.35

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.0315 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 1/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Chromium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Dissociates above 1300°C (Merck 1983, p. 316)

Specific Gravity (H_2O=1): 2.87 (Merck 1983, p. 316)

Vapor Pressure (mmHg): Not Found

Melting Point: 2106°F, 1152°C (Merck 1983, p. 316)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Hawley 1981, p. 248); slightly soluble in hot water (Weast 1984, p. B-85).

Appearance and Odor: Violet, lustrous, hexagonal, crystal scales; greasy feel (Merck 1983, p. 316).

CHROMIC CHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Chromium Metal and Insoluble Salts) TWA 1.0 mg/m^3 (NIOSH 1987, Appendix D)

ACGIH TLV: (Chromium (III) Compounds, as Chromium) TWA 0.5 mg/m^3 (ACGIH 1985, p. 14)

IDLH: Not Found

Other Limits Recommended: (Chromium metal and insoluble salts), IDLH 500 mg/m^3, as chromium (NIOSH 1987, p. 82).

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 70)
Skin: Yes (Sax 1984, p. 791)
Ingestion: Yes (Sax 1984, p. 791)

Health Hazards (Acute, Delayed, and Chronic): It displays high dermal toxicity, and moderate oral toxicity (Sax 1984, p. 791).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of chlorine containing compounds (Sax 1984, p. 791).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Strong oxidizers (NIOSH/OSHA 1978, p. 70)

Incompatibility (Materials to Avoid): Violent reaction with lithium, nitrogen (Sax 1984, p. 791).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorine containing compounds (Sax 1984, p. 791).

CHROMIC CHLORIDE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

In chromizing; in the manufacture of chromium metal and compounds; as a catalyst for polymerization of olefins and other organic reactions; as a textile mordant; in tanning; in corrosion inhibitors; and as a waterproofing agent (Merck 1983, p. 316).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material. Avoid inhalation (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for CHROMIC CHLORIDE

(10025-73-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Violet, lustrous, hexagonal, crystalline scales.

Commercial Form - Dark green salt.

Uses - Metal tanning, chromium plating, textile mordant, corrosion inhibitor, polymerization catalyst, waterproofing, manufacture of olefins.

Other Names - Chromium (III) chloride, chromium chloride, chromium trichloride, puratronic chromium chloride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, water, milk, ascorbic acid, normal saline, D5W, Ringer's lactate, magnesium hydroxide (or another antacid), sodium bicarbonate, KCl, furosemide, mannitol, dopamine.

Signs and Symptoms of Acute Chromic Chloride Exposure:

Warnings: *Effects may not appear for several days. Caution is advised.*

Acute exposure to chromic chloride may produce signs and symptoms that include corneal injury, oral burns, deep perforating ulcers, gastrointestinal inflammation, and hemorrhage. Pulmonary edema, bronchial asthma, circulatory collapse, and shock may also occur.

Delayed effects such as hepatic encephalopathy, pneumoconiosis, acute hepatitis, renal failure, anemia, and thrombocytopenia may take as many as 7 days to manifest. Hospitalization is essential.

CHROMIC CHLORIDE

Emergency Life-Support Procedures:

Acute exposure to chromic chloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to chromic chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to chromic chloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas with a 10 to 20% ascorbic acid solution for 15 minutes. If ascorbic acid solution is unavailable, water may be used.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

CHROMIC CHLORIDE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHORUS OXYCHLORIDE

CAS Registry Number: 10025-87-3

Synonyms: Phosphoric Chloride; Phosphoric Trichloride; Phosphoroxychloride; Phosphorus Chloride; Phosphorus Chloride Oxide; Phosphorus Oxide Trichloride; Phosphorus Oxytrichloride; Phosphoryl Chloride; Phosphoryl Trichloride; Trichlorophosphine Oxide; Trichlorophosphorus Oxide

Chemical Formula: Cl_3OP

Molecular Weight: 153.32

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.3 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1,000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 223°F, 106°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.645 at 25°C (*Merck 1976)

Vapor Pressure (mmHg): 40 at 27.3°C (*Sax 1979)

Melting Point: 34.2°F, 1.25°C (*Merck 1976)

Vapor Density (AIR=1): 5.3 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water (*Hawley 1977); reacts exothermically with water (Merck 1983, p. 1060)

PHOSPHORUS OXYCHLORIDE

SECTION II (continued)

Appearance and Odor: Colorless to light yellow, oily liquid with a pungent, musty odor (*CHRIS 1978).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.1 ppm (0.6 mg/m^3); STEL 0.5 ppm (3.0 mg/m^3) (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Hawley 1977)
Skin: Yes (Sax 1984, p. 2225)
Ingestion: Yes (*Hawley 1977)

Health Hazards (Acute, Delayed, and Chronic): This poison is toxic by inhalation and ingestion and is strongly irritating to skin and tissues (*Hawley 1977). It causes burns of the mucous membranes of the mouth and digestive tract (*Lefaux 1968), and may be fatal (DASE 1980, p. 749).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Flammable
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish by smothering with suitable dry chemical. Use water on combustibles burning in vicinity of this material (*NFPA 1978). Use dry chemical, carbon dioxide, or dry sand; do not use water on material itself; if large quantities of combustibles are involved, use water in flooding quantities as spray and fog; use water spray to absorb vapors; cool all affected containers with flooding quantities of water; apply water from as far a distance as possible (Student 1981, p. 406).

Special Fire Fighting Procedures: Avoid breathing vapors; keep upwind. Wear self-contained breathing apparatus. Avoid bodily contact with the material. Wear boots, protective gloves, and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. If contact with the material is anticipated, wear full protective clothing (Student 1981, p. 406). Keep unnecessary people away; isolate hazard area and deny entry (DOT 1984, Guide 39).

PHOSPHORUS OXYCHLORIDE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: Poisonous, corrosive, and irritating gases are generated when this material is heated or is in contact with water (Weiss 1980, p. 747). It may ignite other combustible materials (wood, paper, oil, etc.). It reacts violently with water (DOT 1984, Guide 39).

NFPA Flammability Rating: 0

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 747)

Conditions to Avoid: Do not store with combustible materials, particularly fibrous organic materials, or with electrical or other equipment that can be corroded. Reacts violently with moisture (*NFPA 1978).

Incompatibility (Materials to Avoid): Incompatible with carbon disulfide; N,N-dimethylformamide; 2,5-dimethylpyrrole; 2,6-dimethyl- pyridine N-oxide; dimethylsulfoxide; Ferrocene-1,1-dicarboxylic acid; water; and zinc (Sax 1984, p. 2225).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of chlorides and oxides of phosphorus; it will react with water or steam to produce heat and toxic and corrosive fumes (Sax 1984, p. 2225).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used as a solvent in cryoscopy (*Merck 1976); chemical intermediate for cresyldiphenyl phosphate, tricresyl phosphate, triphenylphosphate, and other cyclic and acylic phosphate esters; organic chlorinating agent (*SRI); manufacture of plasticizers, hydraulic fluids, gasoline additives, and fire retarding agents; and as a catalyst (*ACGIH 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep material out of water sources and sewers; build dikes to contain flow as necessary; use water spray to knock down vapors; do not use water on material itself; and neutralize spilled material with crushed limestone, soda ash, or lime. For a land spill, dig a pit, pond, lagoon, or holding area to contain liquid or solid material; dike surface flow

PHOSPHORUS OXYCHLORIDE

SECTION VII (continued)

using soil, sand bags, foamed polyurethane, or foamed concrete; absorb bulk liquid with fly ash or cement powder; neutralize with agricultural lime (slaked lime), crushed limestone, or sodium bicarbonate. For a water spill, neutralize with agricultural lime (slaked lime), crushed limestone, or sodium bicarbonate; use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates; adjust pH to neutral (pH-7). For air spills apply water spray or mist to knock down vapors; vapor knock down water is corrosive or toxic and should be diked for containment (Student 1981, p. 406). Stop leak if you can do so without risk. Do not touch spilled material. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Clean up only under supervision of an expert (DOT 1984, Guide 39).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	POOR/LIMITED
Neoprene	POOR/MANY
Nonwovwen PE	POOR/MANY
PVC	POOR/MANY
Saranex	POOR/LIMITED
Viton	POOR/LIMITED

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include burns and extensive reddening of eyes, pains in throat, coughing, labored breathing with a shortness of breath (*Lefaux 1968), dizziness, headache, weakness, nausea, vomiting, chest pain, bronchitis, bronchopneumonia, pulmonary edema and kidney damage (*ACGIH 1980).

Emergency and First Aid Procedures: Move victim to fresh air, call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. Speed in removing materials from skin is of extreme importance. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 39).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHORUS PENTACHLORIDE

CAS Registry Number: 10026-13-8

Synonyms: Pentachlorophosphorane; Pentachlorophosphorus; Phosphorane, Pentachloro-; Phosphoric Chloride; Phosphoric Perchloride; Phosphorous Pentachloride; Phosphorus Chloride; Phosphorus Pentachloride, Solid; Phosphorus Perchloride; Phosphorus(V) Chloride

Chemical Formula: PCl_5

Molecular Weight: 208.27

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.205 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 320°F, 160°C (*Merck 1976)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 1 at 55.5°C (*Sax 1975)

Melting Point: (decomposes) 298°F (148°C) (under pressure) sublimes at about 100°C without melting (*Merck 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Reacts violently with water (Sax 1984, p. 2223)

PHOSPHORUS PENTACHLORIDE

SECTION II (continued)

Appearance and Odor: Pale yellow solid with an odor like hydrochloric acid (NIOSH/OSHA 1978, p. 154); white to pale yellow crystalline with a pungent, unpleasant odor (*Merck 1976).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 1 mg/m^3 (NIOSH/OSHA 1978, p. 154)

ACGIH TLV: TWA 0.1 ppm (1.0 mg/m^3) (ACGIH 1983, p. 29)

IDLH: 200 mg/m^3 (NIOSH/OSHA 1978, p. 154)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2223)
Skin: Yes (Sax 1984, p. 2223)
Ingestion: Yes (Sax 1984, p. 2223)

Health Hazards (Acute, Delayed, and Chronic): It can cause death due to pulmonary edema (Encyc Occupat Health and Safety 1983, p. 1683) or by circulatory shock (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: If material is involved in fire then use dry chemical, carbon dioxide, or dry sand. Do not use water on material itself. If large quantities of combustibles are involved, use water in flooding quantities (i.e., spray or fog), and use water spray to absorb vapors (Student 1981, p. 407).

Special Fire Fighting Procedures: Avoid breathing vapors; keep upwind. Wear self-contained breathing apparatus. Avoid bodily contact with the material; wear boots, protective gloves, and goggles (Student 1981, p. 407).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits highly toxic fumes of chlorides and chlorine (see Section IV below). Will react with water or steam to produce heat and toxic and corrosive fumes. Reacts violently with moisture, chlorine trioxide, fluorine hydroxylamine, magnesium oxides, diphosphorus trioxide, sodium and potassium (Sax 1984, p. 2223). Decomposed by water to form hydrogen chloride, phosphoric acids, corrosive materials, and heat. This heat may

PHOSPHORUS PENTACHLORIDE

SECTION IV (continued)

be sufficient to ignite surrounding combustible materials (Student 1981, p. 407).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Clayton and Clayton 1981-82)
Stable:

Conditions to Avoid: Produces phosphorus trichloride and chlorine when heated (*Clayton and Clayton 1981-82).

Incompatibility (Materials to Avoid): Water, magnesium oxide, chemically active metals: sodium, potassium; alkalis (NIOSH/OSHA 1978, p. 154). Aluminum; chlorine dioxide; chlorine; diphosphorus trioxide; fluorine; hydroxylamine; magnesium oxide; 3'-methyl-2-nitrobenzanilide; nitrobenzene; sodium; urea; water (Sax 1984, p. 2223).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits highly toxic fumes of chlorides (Sax 1984, p. 2223). It is decomposed by water to form hydrochloric and phosphoric acids, corrosive materials and heat. This heat may ignite surrounding combustible material (Student 1981, p. 407).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chlorinating and dehydrating agent; (Hawley 1981, p. 811) catalyst in manufacturing of acetylcellulose and benzotrichloride from benzal chloride; dehydrating agent (*SRI). Also used for converting acids into acid chlorides (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep material out of water sources and sewers. Use water spray to knock down vapors. Do not use water on material itself; neutralize spilled material with crushed limestone, soda ash, or lime. Avoid breathing vapors; keep upwind. Avoid bodily contact with the material;
Do not handle broken packages without protective equipment. Wash away any materials which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 407).

PHOSPHORUS PENTACHLORIDE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Can cause death by pulmonary edema or circulation shock. Fumes cause irritation of eyes and respiratory passages. Upon ingestion, immediate pain in the mouth and throat, abdominal pain, nausea, vomiting of mucoid and "coffee-ground" material, intense thirst, clammy skin, weak and rapid pulse, shallow respiration, and circulatory shock occur (*Gosselin 1976; Encyc Occupat Health and Safety 1983, p. 1683).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove and isolate contaminated clothing and shoes at the site. Speed in removing material from skin is of extreme importance. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 39).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- OZONE

CAS Registry Number: 10028-15-6

Synonyms: Oxygen, Mol; Triatomic Oxygen

Chemical Formula: O_3

Molecular Weight: 48.00

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.0094 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -169.6°F, -111.9°C (*Weast 1979)

Specific Gravity (H_2O=1): Gas: 2.144 g/liter at 0°C (*Weast 1979)

Vapor Pressure (mmHg): 41,257 (54 atm) at -12°C (DASE 1980, p. 710)

Melting Point: -314°F, -192.7°C (*Weast 1979)

Vapor Density (AIR=1): 1.7 (DASE 1980, p. 710)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 49 ml/100 ml at 0°C (*Weast 1979)

Appearance and Odor: Ozone is a colorless to bluish gas, a dark blue liquid, or blue-black crystals (*Weast 1979; *Merck 1976). It has a characteristic odor in concentrations less than 2 ppm (*Merck 1976).

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SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.1 ppm (0.2 mg/m^3) (OSHA 1984, p. 663)

ACGIH TLV: TWA 0.1 ppm (0.2 mg/m^3); STEL 0.3 ppm (0.6 mg/m^3) (*ACGIH 1982)

IDLH: 10 ppm (NIOSH/OSHA 1978, p. 176)

Other Limits Recommended: EEGL 1.0 ppm (60 minutes) (NRC 1984a, pp. 99-107).

Routes of Entry: **Inhalation:** Yes (*Sax 1979)
Skin: Yes (*Sax 1979)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Ozone is highly toxic via inhalation or by contact of liquid to skin, eyes, or mucous membranes. It is capable of causing acute to chronic lung damage, burns, and death or permanent injury (*Sax 1979). Ozone can be toxic at a concentration of 100 ppm for 1 minute (*NIOSH/RTECS 1985). Ozone is capable of causing death from pulmonary edema (Doull 1980, p. 619). It increases sensitivity of the lungs to bronchoconstrictors and allergens (*Gilman 1980); increases susceptibility to and severity of lung bacterial and viral infections (*ACGIH 1980).

Medical Conditions Generally Aggravated by Exposure: Ozone increased the sensitivity of the lung to bronchoconstrictors (*Gilman 1980).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: In case of fire: keep cylinder cool by spraying water (DASE 1980, p. 710).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Severe explosion hazard when shocked, exposed to heat or flame, or by chemical reaction with organic substances, especially reducing agents (*Rumack 1975 to Present). Ozone is a powerful oxidizing agent (*Encyc Occupat Health and Safety 1971).

NFPA Flammability Rating: Not Found

OZONE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*Encyc Occupat Health and Safety 1971).
Stable:

Conditions to Avoid: Contact with organic materials (Hawley 1981, p. 769)

Incompatibility (Materials to Avoid): Alkenes; aromatic compounds; benzene, rubber; bromine; dicyanogen; diethyl ether; dinitrogen tetroxide; hydrogen bromide; 4-hydroxy-4-methyl-1,6-heptadiene; nitrogen trichloride; stibine; tetrafluorohydrazine (Sax 1984, p. 2110).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Disinfectant for air and water; used for bleaching waxes, textiles and oils (*Merck 1976), ozonolysis of unsaturated fatty acids to pelargonic and other acids; manufacture of ink; catalyst; water treatment for taste and odor control; mold and bacteria inhibitor in cold storage; bleaching agent (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Irritating Agent, n.o.s.) Isolate area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them (DOT 1984, Guide 58). Workers handling liquid ozone should wear protective equipment designed for exposure to cryogenic liquid (*Encyc Occupat Health and Safety 1971).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

OZONE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for OZONE

(10028-15-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to bluish gas.

Odor - Pungent.

Uses - Catalyst, bactericide, bleaching agent, industrial waste treatment, purification of drinking water, deodorization of air and sewage gases, production of peroxides, manufacture of ink.

Materials to Avoid - Oxidizable materials.

Other Names - O_3, triatomic oxygen.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Ozone Exposure:

Warning: *Effects may be delayed for 12 to 24 hours. Caution is advised.*

Signs and symptoms of acute exposure to ozone may be severe and include irritation and burns of the skin, eyes, and mucous membranes. An increased respiratory rate, shallow breathing, cough, dyspnea (shortness of breath), bronchitis, pulmonary edema, and pulmonary hemorrhage may occur. Tachycardia (rapid heart rate) and hypotension (low blood pressure) may be observed.

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Neurologic effects include fatigue, dizziness, drowsiness, headache, exhiliration, and depression. Nausea, vomiting, and anorexia may occur. Eye exposure may result in conjuctivitis (red, inflamed eyes).

Emergency Life-Support Procedures:

Acute exposure to ozone may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to ozone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to ozone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. THOROUGHLY wash exposed skin areas with soap and water.

OZONE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THALLIUM SULFATE

CAS Registry Number: 10031-59-1

Synonyms: (NIOSH/RTECS 1983 SYNONYMS, VOLUME 3, p. 706) Thallous Sulfate; Ratox; Sulfuric Acid, Thallium Salt; Zelio

Chemical Formula: $Tl(SO_4)x$

Molecular Weight:

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 16.0 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): In Thallium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 632°C (Merck 1983, p. 9095)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

THALLIUM SULFATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Thallium soluble compounds) TWA 0.1 mg (Tl)/m^3 (skin) (NIOSH 1987, p. 224)

ACGIH TLV: (Thallium soluble compounds) TWA 0.1 mg (Tl)/m^3 (skin) (ACGIH 1986-87, p.31)

IDLH: Not Found

Other Limits Recommended: IDLH for thallium soluble compounds 20 mg/m^3 (as thallium) (NIOSH 1987, p. 224)

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 2557)

Health Hazards (Acute, Delayed, and Chronic): A dangerous, highly toxic metal salt. Its main hazard is as a chronic poison due to its accumulation, especially in liver, brain, and skeletal muscle. Fatal human dose is about 500 mg of thallium. Many reported fatalities (Sax 1984, p. 2557).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Thallium Salts, n.o.s.) If material is involved in fire, extinguish fire using agent suitable for type of surrounding fire (material itself does not burn or burns with difficulty). Use water in flooding quantities as fog. Use foam, carbon dioxide or dry chemical (Student 1981, p. 497). For small fires use dry chemical, carbon dioxide, water spray, or foam. For large fires use water spray, fog, or foam. Move container from fire area if you can do so without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: (Non-Specific -- Thallium Salts, n.o.s.) For personnel protection avoid breathing dusts, and fumes from burning material. Keep upwind. Avoid bodily contact with the material. Wear boots, protective gloves, and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Wear self-contained breathing apparatus when fighting fires involving this material. If contact with the material is anticipated, wear full protective clothing (Student 1981, p. 497). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas.

THALLIUM SULFATE

SECTION IV (continued)

Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of thallium and sulfur oxide (Sax 1984, p. 2557).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of thallium and sulfur oxides (Sax 1984, p. 2557).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Rodenticide (Sax 1984, p. 2557). Used for control of rats, moles and house mice (Farm Chemicals Handbook 1984, p. C-223). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Thallium Salts, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the

THALLIUM SULFATE

SECTION VIII (continued)

beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: A dangerous, highly toxic metal salt. Ingestion causes abdominal pain, vomiting, trembling, convulsions, paralysis, shortness of breath, collapse, and death (Sax 1984, p. 2557).

Emergency and First Aid Procedures: (Non-Specific -- Thallium Salts, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

COMMENTS

Sources searched but no information found:

Hawley 1981
Weast 1979
Merck 1983
NFPA 1984
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Encyc Occupat Health and Safety 1983
Buchel 1983
Hayes 1982

EPA CHEMICAL PROFILE

Date: October 9, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM SELENITE

CAS Registry Number: 10102-18-8

Synonyms: Selenious Acid, Disodium Salt; Disodium Selenite; Disodium Selenium Trioxide; Sodium Selenium Oxide [Na2SeO3]; Selenious Acid (H2SeO3), Disodium Salt

Chemical Formula: Na_2O_3Se

MolecularvWeight: 172.92

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): In Selenium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Freely soluble in water (*Merck 1983). Soluble in water to form a slightly alkaline solution/pentahydrate (*Clayton and Clayton 1982).

SODIUM SELENITE

SECTION II (continued)

Appearance and Odor: Tetragonal prisms (*Merck 1983). White crystals (Sax 1984, p. 2451).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Selenium compounds) (TWA) 0.2 mg/m^3, as selenium (NIOSH 1987, p. 206)

ACGIH TLV: (Selenium compounds) (TWA) 0.2 mg/m^3, as selenium (ACGIH 1986-87, p. 29)

IDLH: Not Found

Other Limits Recommended: IDLH for selenium compounds 100 mg/m^3 (as selenium) (NIOSH 1987, p. 206)

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2451)
Skin: Not Found
Ingestion: Yes (Hawley 1981, p. 951)

Health Hazards (Acute, Delayed, and Chronic): Toxic by ingestion (Hawley 1981, p. 951). In humans, a concentration of 5 ppm in food or 0.5 ppm in milk or water has been estimated to be dangerous (selenium compounds) (*Clarke 1981). Elemental selenium has low acute systemic toxicity, but dust or fumes can cause serious irritation of the respiratory tract (non-specific selenium compounds) (Sax 1984, p. 2390).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: dry chemical carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (*DOT 1984).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: May burn but will not ignite readily (*DOT 1984). When heated to decomposition, may emit toxic fumes of selenium and sodium oxide (Sax 1984, p. 2541).

NFPA Flammability Rating: Not Found

SODIUM SELENITE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes. Stable in air (*Merck 1983).

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition it emits toxic fumes of selenium and sodium oxide (Sax 1984, p. 2451).

Hazardous Polymerization: May Occur: Not Found
May Not Occur:

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Removing green color from glass during its manufacture; alkaloidal reagent (*Merck 1983); reagent in bacteriology; testing germination of seeds; decorating porcelain (*Hawley 1981). Livestock feed additive (*Peer Review Committee).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing dust (see Section III above). Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Small dry spills: shovel material into clean, dry container and cover. Large spills: dike far ahead of spill for later disposal (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

SODIUM SELENITE

SECTION VIII (continued)

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Selenium Compounds) Garlic odor of breath is a common symptom. Pallor, nervousness, depression, and digestive disturbances have been reported in cases of chronic exposure (Sax 1984, p. 2390).

Emergency and First Aid Procedures: Isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (*DOT 1984).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM TELLURITE

CAS Registry Number: 10102-20-2

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 686): Telluric Acid, Disodium Salt; Sodium Tellurate (IV); Tellurous Acid, Disodium Salt

Chemical Formula: Na_2TeO_3

Molecular Weight: 221.58

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in water (Merck 1983, p. 1242)

Appearance and Odor: White crystals (Weast 1979, p. B-129)

SODIUM TELLURITE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Tellurium and compounds) TWA 0.1 mg/m^3, as tellurium (NIOSH 1987, p. 216)

ACGIH TLV: (Tellurium and compounds) TWA 0.1 mg/m^3, as tellurium (ACGIH 1986-87, p. 30)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Tellurium, Compounds) (NIOSH/OSHA 1978, p. 173)
Skin: Yes (Sax 1984, p. 2454)
Ingestion: Yes (Sax 1984, p. 2454)

Health Hazards (Acute, Delayed, and Chronic): The material is both an oral and dermal toxic hazard (Sax 1984, p. 2454). The material is toxic by ingestion (Hawley 1981, p. 953). (Non-Specific -- Tellurium Compounds) Oral ingestion of tellurium compounds is generally regarded as extremely toxic. The probable oral lethal dose is 5-50 mg/kg or between 7 drops and 1 teaspoonful for a 70 kg (150 pound) person. Tellurium compounds are regarded as super toxic for skin exposures (Gosselin 1976, p. 90).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

SODIUM TELLURITE

SECTION V (continued)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of tellurium and sodium monoxide (Sax 1984, p. 2454).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Sodium tellurite is used in bacteriology and medicine (Hawley 1981, p. 953).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Tellurium) Symptoms include garlic odor of the breath and a metallic taste in the mouth, drowsiness, and a loss of appetite (Encyc Occupat Health and Safety 1983, p. 2156).

Emergency and First Aid Procedures: (Non-Specific -- Tellurium Compounds) Eyes: irrigate immediately. Skin: wash with soap and water immediately. If breathed in large amounts, move to fresh air, perform artificial

SODIUM TELLURITE

SECTION IX (continued)

respiration if necessary; keep person warm and at rest. If swallowed and person is conscious, give large amounts of water and try to get the person to vomit by having him touch the back of his throat with his finger (NIOSH/OSHA 1978, p. 173).

COMMENTS

Sources searched but no information found:

DOT 1984
Student 1981
Weiss 1980
DASE 1980
NFPA 1984
CHRIS 1978

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NITRIC OXIDE

CAS Registry Number: 10102-43-9

Synonyms: Mononitrogen Monoxide; Nitrogen Monoxide; Nitrogen Oxide

Chemical Formula: NO

Molecular Weight: 30.01

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rabbit) 0.39 mg/liter/15 minutes

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -241.1°F, -151.7°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.27 at -150.2°C (*Merck 1976)

Vapor Pressure (mmHg): 26,000 at 20°C (*ACGIH 1980)

Melting Point: -262.5°F, -163.6°C (*Merck 1976)

Vapor Density (AIR=1): 1.04 (*Merck 1976)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 7.34 mL/100 mL at 0°C (*Weast 1979)

Appearance and Odor: Colorless gas; deep blue when liquid; bluish-white snow when solid (*Merck 1976). Colorless gas with sharp, sweet odor; brown at high concentrations in air (NIOSH/OSHA 1978, pp. 138-139).

NITRIC OXIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 25 ppm (30 mg/m^3) (NIOSH 1987, p. 174)

ACGIH TLV: TWA 25 ppm, 30 mg/m^3; (ACGIH 1986-87, p. 25)

IDLH: 100 ppm (NIOSH/OSHA 1978, pp. 138-139)

Other Limits Recommended: NIOSH: 25 ppm (30 mg/m^3) 10-hour TWA (NIOSH 1987, p. 174)

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (NIOSH/OSHA 1978, p. 138)
Ingestion: Yes (NIOSH/OSHA 1978, p. 138)

Health Hazards (Acute, Delayed, and Chronic): Can cause death or permanent injury after a very short exposure to small quantities (*Sax 1975). Irritant of eyes, nose, throat; can cause unconsciousness (NIOSH/OSHA 1978, pp. 138-139). Nitric oxide forms acids in the respiratory system which are irritating and cause congestion in the lungs. Concentrations of 60-150 ppm cause immediate irritation of the nose and throat with coughing and burning in the throat and chest. 6-24 hours after exposure, labored breathing and unconsciousness may result. Concentrations of 100-150 ppm are dangerous for short exposure of 30-60 minutes. Concentrations of 200-700 ppm may be fatal after very short exposure (Sax 1984, p. 2004).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical or carbon dioxide. For large fires, use water spray, fog, or foam (DOT 1984, Guide 20).

Special Fire Fighting Procedures: Wear positive pressure breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk. Stay away from ends of tanks. Spray cooling water on containers that are exposed to flames until well after fire is out. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn (DOT 1984, Guide 20).

Unusual Fire and Explosion Hazards: Burns only when heated with hydrogen (*Merck 1976). With carbon disulfide, it reacts explosively with emission of light. When mixed with chlorine monoxide, can be explosive. Explodes on contact with nitrogen trichloride. When mixed with ozone, it will

NITRIC OXIDE

SECTION IV (continued)

explode (*NFPA 1978). Will react with water or steam to produce heat and corrosive fumes. Reacts vigorously with reducing materials. When heated to decomposition, highly toxic fumes of nitrogen oxides are emitted (*Sax 1975). May ignite other combustible materials (wood, paper, oil, etc.). Mixture with fuels may explode. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers (DOT 1984, Guide 20).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Sax 1975)

Conditions to Avoid: Storage in direct sunlight, or areas of high fire hazard (*Sax 1975).

Incompatibility (Materials to Avoid): Aluminum, boron, carbon disulfide, hypochlorite, chromium, fluorine, fuels, hydrocarbons, nitrogen trichloride, ozone, phosphorus, uns-dimethyl hydrazine, uranium, acetic anhydride, ammonia, barium oxide, boron trichloride, methyl chloride, 1,2-dichloroethane, dichloroethylene, ethylene, iron, magnesium, manganese, olefins, potassium, propylene, sodium, sulfur, trichloroethylene, 1,1,1-trichloroethane, uns-tetrachloroethane (Sax 1984, p. 2004); and reducing agents (*Sax 1975).

Hazardous Decomposition or Byproducts: When heated to decomposition, highly toxic fumes of nitrogen oxides are emitted. Reacts with water or steam to produce heat and corrosive fumes (*Sax 1975). Reacts with oxygen to form poisonous nitrogen dioxide (Student 1981, p. 368).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Manufacturing of nitric acid, in bleaching of rayon, stabilizer for propylene, methyl ether (*Merck 1976), to prepare nitrosyl carbonyls (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Keep combustibles (wood, paper, oil, etc.) away from spilled

NITRIC OXIDE

SECTION VII (continued)

material. Stop leak if you can do so without risk. Isolate area until gas has dispersed (DOT 1984, Guide 20).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED*
CPE	GOOD/LIMITED*
PVC	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Can cause death due to blockage of gas exchange in lungs. Initially, symptoms include slight coughing, fatigue and nausea at high concentrations, coughing, choking, headache, nausea, abdominal pain and shortness of breath are seen. Latent symptoms are uneasiness, restlessness, rapid and shallow breathing, bluing of skin, lips and fingernail beds, anxiety, mental confusion, and finally loss of consciousness (*Gosselin 1976).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation (DOT 1984, Guide 20).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NITROGEN DIOXIDE

CAS Registry Number: 10102-44-0

Synonyms: Nitrito; Nitro; Nitrogen Dioxide (liquid); Nitrogen Oxide (NO2); Nitrogen Peroxide

Chemical Formula: NO_2

Molecular Weight: 46.01

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (guinea pig) 0.056 mg/liter/hour (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 10 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: 70.07°F, 21.15°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.448 at 20°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): 720 at 20°C (*NIOSH/OSHA 1978, p. 140)

Melting Point: 15.3°F, -9.3°C (*Merck 1976)

Vapor Density (AIR=1): 1.58 (*Merck 1976)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble; decomposes (Weast 1980, p. B-103)

Appearance and Odor: Colorless solid, yellow liquid (*Weast 1979). Reddish-brown gas, liquid below 21.15°C, has an irritating odor (*Merck 1976).

NITROGEN DIOXIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Ceiling 5 ppm (9 mg/m^3) (OSHA 1984, p. 663)

ACGIH TLV: TWA 3 ppm (6 mg/m^3); STEL 5 ppm (10 mg/m^3) (*ACGIH 1982)

IDLH: 50 ppm (NIOSH/OSHA 1978, p. 140)

Other Limits Recommended: NIOSH: 1.0 ppm (1.8 mg/m^3) 15-minute ceiling (NIOSH 1987, p. 176). SPEGL 1.0 ppm (60 minutes) (NRC 1985a, pp. 83-96).

Routes of Entry: **Inhalation:** Yes (*Sax 1979)
Skin: Yes (Student 1981, p. 371)
Ingestion: Yes (NIOSH/OSHA 1978, p. 141)

Health Hazards (Acute, Delayed, and Chronic): Severe exposures may be fatal (DASE 1980, p. 685). Contact may cause burns to skin and eyes. Contact with liquid may cause frostbite (DOT 1984, Guide 20). This compound was reported to react with blood to form methemoglobin (*Gosselin 1978). The lowest lethal human inhalation dose has been reported at 200 ppm/1 min (*NIOSH/RTECS 1985).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Does not burn (*Merck 1983)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn (DOT 1984, Guide 20).

Special Fire Fighting Procedures: Move container from fire area if you can do so without risk. Stay away from ends of tanks. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 20).

Unusual Fire and Explosion Hazards: When heated to decomposition, toxic fumes of nitrogen oxides are emitted (Sax 1984, p. 2023). May ignite other combustible materials (wood, paper, oil, etc.). Mixture with fuels may explode. Container may explode in heat of fire. Vapor explosion and poison hazard may occur indoors, outdoors or in sewers (DOT 1984, Guide 20).

NFPA Flammability Rating: 0

NITROGEN DIOXIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 664)

Conditions to Avoid: Moisture and physical damage to storage container (*NFPA 1978)

Incompatibility (Materials to Avoid): Incompatible with combustible matter, chlorinated hydrocarbons, ammonia, carbon disulfide (NIOSH/OSHA 1978, p. 171). Reacts with alkalies to form nitrates and nitrites (*Merck 1976). Violent reaction with cyclohexane, fluorine, formaldehyde, alcohols, nitrobenzene, petroleum, and toluene (Sax 1984, p. 2023).

Hazardous Decomposition or Byproducts: Decomposes in water forming nitric acid and nitric oxide (*Merck 1976)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is used in bleaching flour; in initiation of organic compounds and explosives; in manufacture of oxidized cellulose for acrylates (*Hawley 1977); as a chemical intermediate (captive) for nitric acid; and as a catalyst for sulfuric acid (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Evacuate area endangered by gas (DOT 1984, Guide 20). For water spills, neutralize with agricultural lime (slaked lime), crushed limestone, or sodium bicarbonate. For an air spill, apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment (Student 1981, p. 371). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if you can do so without risk. Use water spray to reduce vapor but do not put water on leak or spill area. Isolate area until gas has dispersed (DOT 1984, Guide 20).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating,

NITROGEN DIOXIDE

SECTION VIII (continued)

chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED*
Viton/Neoprene	POOR/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for NITROGEN DIOXIDE

(10102-44-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Reddish-brown gas (high pressure or low temperature results in the reversible formation of a yellow or brown liquid or colorless solid of nitrogen tetroxide, CAS No. 10544-72-6).

Odor - Pungent, acrid, mildly irritating.

Commercial Form - 99.5% pure liquid in 125-, 150-, 2000-lb cylinders; tank cars.

Uses - Bleaching flour, manufacture of oxidized cellulose, nitric acid, catalyst for manufacture of sulfuric acid, component of explosives, oxidizer for rocket fuels.

Materials to Avoid - Combustible matter, chlorinated hydrocarbons, ammonia, alkali, formaldehyde, alcohol, petroleum, water (except for use in emergency life support).

Caution: *Nitrogen dioxide reacts violently with many substances, especially reducing agents such as ammonia or amines. Spontaneous ignition is likely upon contact with combustible matter. Nitrogen dioxide will decompose in water to nitric acid and nitric oxide.*

Other Names - Nitro, nitrogen peroxide.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

NITROGEN DIOXIDE

Signs and Symptoms of Acute Nitrogen Dioxide Exposure:

Warning: *Effects may be delayed for hours to days. Caution is advised.*

Acute exposure to nitrogen dioxide may be severe and result in a weak, rapid pulse; cyanosis (blue tint to the skin and mucous membranes); and circulatory collapse. Cough, dyspnea (shortness of breath), bronchitis, pneumonitis, and pulmonary edema may occur following inhalation exposure. Gastrointestinal symptoms include nausea and abdominal pain. Fatigue, lethargy, restlessness, fever, anxiety, headache, mental confusion, and loss of consciousness may also occur. Contact with the skin and mucous membranes may result in severe irritation and burns. When liquid nitrogen dioxide contacts the skin, frostbite will result.

Emergency Life-Support Procedures:

Acute exposure to nitrogen dioxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to nitrogen dioxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to nitrogen dioxide.

NITROGEN DIOXIDE

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas with soap and water for at least 15 minutes.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Activated charcoal is of no value.

5. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- POTASSIUM ARSENITE

CAS Registry Number: 10124-50-2

Synonyms: Arsenious Acid, Potassium Salt; Arsenenous Acid, Potassium Salt; Arsonic Acid, Potassium Salt; Fowler's Solution; NSC 3060; Potassium Arsenite, Solid; Potassium Metaarsenite

Chemical Formula: $KAsO_2HAsO_2$ (Weiss 1986, p. 848)

Molecular Weight: 253.9

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 14 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1,000 (pounds) (statutory)

Section 313 Listed (Yes or No): In Arsenic Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in water (*Weast 1979)

Appearance and Odor: White hygroscopic powder (*Merck 1976)

POTASSIUM ARSENITE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p. 54)

ACGIH TLV: (Arsenic and compounds) 0.2 mg/m^3, as arsenic (ACGIH 1986-87, p. 10)

IDLH: Not Found

Other Limits Recommended: NIOSH: 0.002mg/m^3 15-minute ceiling, as arsenic (NIOSH 1987, p. 54)

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Not Found
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): Very toxic: probable oral lethal dose in humans is 50-500 mg/kg, or between 1 teaspoonful and one ounce for a 150-lb. adult (*Gosselin 1976). It is a skin irritant and allergen (*Sax 1975).

Medical Conditions Generally Aggravated by Exposure: Acute allergic reactions to arsenic compounds are fairly common (Sax 1984, p. 2268-2269).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with dry chemical, carbon dioxide, water spray or foam (*DOT 1984).

Special Fire Fighting Procedures: Keep unnecessary people away; stay upwind; keep out of low areas. Wear full protective clothing and self-contained breathing apparatus (DOT 1984, Guide 54).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gases (*DOT 1984)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (*IARC 1972-1985)
Stable:

Conditions to Avoid: Aeration (*IARC 1972-1985)

POTASSIUM ARSENITE

SECTION V (continued)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Reduces silver salt to metallic silver during mirror silvering. Currently, it is probably not being used (Merck 1983, p. 1098).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact. With clean shovel place material into clean, dry container and cover; move containers from spill area. Dike far ahead of spill for later disposal. Do not touch spilled material; stop leak if you can do it without risk (DOT 1984, Guide 54).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Nausea, vomiting and diarrhea result from arsenic ingestion. Patient may go into collapse and shock with weak, rapid pulse, cold sweat, coma, and death. Chronic arsenic poisoning may manifest itself by loss of appetite, cramps, nausea, constipation, or diarrhea.

POTASSIUM ARSENITE

SECTION IX (continued)

Liver damage may cause jaundice. Itching or skin pigmentation changes may occur (*Sax 1975).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water (DOT 1984, Guide 54).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHANOL, 1,2-DICHLORO-, ACETATE

CAS Registry Number: 10140-87-1

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 249): 1,2-Dichloroethyl Acetate

Chemical Formula: $C_4H_6Cl_2O_2$

Molecular Weight: 157.00

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rat) 0.10 mg/liter/4 hours (NIOSH/RTECS 1983, Volume 2, p. 249)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 136-149°F, 58-65°C at 13 mmHg (Hawley 1981, p. 335)

Specific Gravity (H_2O=1): 1.296 at 20°C (Hawley 1981, p. 335)

Vapor Pressure (mmHg): Not Found

Melting Point: Less than -26°F, less than -32°C (Hawley 1981, p. 335)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Hawley 1981, p. 335)

Appearance and Odor: Water-white liquid (Hawley 1981, p. 335)

ETHANOL, 1,2-DICHLORO-, ACETATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 335)
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): This material is toxic by inhalation (Hawley 1981, p. 335).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 307°F, 152°C (Hawley 1981, p. 335)
Flammable Limits: Combustible (Hawley 1981, p. 335)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Combustible Liquid, n.o.s.) Small fires: dry chemical, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam (DOT 1984, Guide 27).

Special Fire Fighting Procedures: (Non-Specific -- Combustible Liquid, n.o.s.) Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. 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. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Isolate one-half mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 27).

Unusual Fire and Explosion Hazards: (Non-Specific -- Combustible Liquid, n.o.s.) 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 (DOT 1984, Guide 27).

NFPA Flammability Rating: Not Found

ETHANOL, 1,2-DICHLORO-, ACETATE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): (Non-Specific -- Esters) Esters may explode on mixing with nitrates (Sax 1984, p. 1298).

Hazardous Decomposition or Byproducts: (Non-Specific -- Chlorinated Hydrocarbons, Aliphatic) When heated to decomposition, it may emit highly toxic fumes of phosgene (Sax 1984, p. 673).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used in organic synthesis (Hawley 1981, p. 335).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Combustible Liquid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 27).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Combustible Liquid, n.o.s.) Move victim to fresh air; call emergency medical care. If not

SECTION IX (continued)

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 (DOT 1984, Guide 27).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- COBALT CARBONYL

CAS Registry Number: 10210-68-1

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 950): Cobalt, Di-mu-Carbonylhexacarbonyldi-, (Co-Co); Cobalt Octacarbonyl; Cobalt Tetracarbonyl; Cobalt Tetracarbonyl Dimer; Di-mu-Carbonylhexacarbonyldicobalt; Dicobalt Carbonyl; Dicobalt Octacarbonyl; Octacarbonyldicobalt

Chemical Formula: $C_8Co_2O_8$

Molecular Weight: 341.94

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.027 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Cobalt Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes at 126°F, 52°C (Weast 1979, p. B-72)

Specific Gravity (H_2O=1): 1.73 at 18°C (Weast 1979, p. B-72)

Vapor Pressure (mmHg): 0.07 at 15°C (Encyc Occupat Health and Safety 1983, p. 493)

Melting Point: 124°F, 51°C (Weast 1979, p. B-72)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1979, p. B-72)

Appearance and Odor: Orange or dark brown crystalline solid (Weast 1979, p. B-72).

COBALT CARBONYL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Cobalt metal, fume and dust) TWA 0.1 mg/m^3, as cobalt (NIOSH 1987, p. 84)

ACGIH TLV: TWA 0.1 mg/m^3, as cobalt (ACGIH 1986-87, p. 14)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 263)
Skin: Yes (Encyc Occupat Health and Safety 1983, p. 493)
Ingestion: Yes (Hawley 1981, p. 263)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic. It is irritating to skin and mucous membranes (Merck 1983, p. 448). Cobalt carbonyls share the general toxicity of carbonyls because of the direct irritant and systemic action of the compound coupled with the effects of carbon monoxide which is released from their decomposition (Encyc Occupat Health and Safety 1983, p. 493).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits carbon monoxide (Sax 1984, p. 800)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (Merck 1983, p. 448)
Stable:

Conditions to Avoid: Decomposes on exposure to air (Merck 1983, p. 448)

COBALT CARBONYL

SECTION V (continued)

Incompatibility (Materials to Avoid): Slowly attacked by hydrochloric acid and sulfuric acid, more rapidly by nitric acid and bromine (Merck 1983, p. 448).

Hazardous Decomposition or Byproducts: Emits carbon monoxide when heated to decomposition (Sax 1984, p. 800).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a catalyst for a number of reactions (Merck 1983, p. 448). It is also used in anti-knock gasoline and for high-purity cobalt salts (Hawley 1981, p. 263).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: The carbonyls are direct irritants (Sax 1984, p. 646). Carbon monoxide causes breathlessness, headache, weakness and fatigue, nausea and vomiting, dimness of vision, collapse and coma (Gosselin 1984, p. III-98).

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) 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 clothing and shoes at the site (DOT 1984, Guide 53).

COBALT CARBONYL

COMMENTS:

Sources searched but no information found:

NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1986
Clayton and Clayton 1981-1982
Arena 1979
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHAMIDOPHOS

CAS Registry Number: 10265-92-6

Synonyms: Phosphoramidothioic Acid, O,S-Dimethyl Ester; Monitor; Acephate-Met; BAY 71628; Bayer 5546; Bayer 71628; Chevron 9006; Chevron Ortho 9006; ENT 27,396; Hamidop; Metamidophos; Monitor (Insecticide); O,S-Dimethyl Ester Amide of Amidothioate; O,S-Dimethyl Phosphoramidothioate; O,S-Dimethyl Phosphoramidothiolate; Ortho 9006; RE 9006; SRA 5172; Tamaron

Chemical Formula: $C_2H_8NO_2PS$

Molecular Weight: 141.14

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes (Worthing 1983, p. 359)

Specific Gravity (H_2O=1): 1.31 at 44.5°C (*Worthing 1979)

Vapor Pressure (mmHg): 0.0003 at 30°C (*Worthing 1979)

Melting Point: 112°F, 44.5°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 90 g/liter at 20°C (*Farm Chemicals Handbook 1981); greater than 2000 g/liter at 20°C (Worthing 1983, p. 359)

METHAMIDOPHOS

SECTION II (continued)

Appearance and Odor: Crystalline solid (*Farm Chemicals Handbook 1981); technical product is off-white (*Worthing 1979); pungent odor (*Spencer 1973).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Farm Chemicals Handbook 1981)
Skin: Yes (*Farm Chemicals Handbook 1981)
Ingestion: Yes (*Farm Chemicals Handbook 1981)

Health Hazards (Acute, Delayed, and Chronic): This material is harmful or fatal if swallowed, inhaled, or absorbed through the skin (*Farm Chemicals Handbook 1981).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

METHAMIDOPHOS

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, at neutral pH (*Worthing 1979)

Conditions to Avoid: Strong acid or alkali (*Worthing 1979)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: (Non-Specific -- Phosphoramidothioic Acid, O-Ethyl S-Methyl Ester) Emits very toxic fumes of nitrogen oxides, phosphorus oxides, and sulfur oxides when heated to decomposition (Sax 1984, p. 2213).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide on a number of vegetables and on cotton (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

METHAMIDOPHOS

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for METHAMIDOPHOS

(10265-92-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Crystalline solid.

Odor - Pungent.

Commercial Form - Off-white, water-soluble concentrate.

Use - Pesticide.

Materials to Avoid - Alkali.

Other Names - Bayer 71628, Hamidop, Monitor, Ortho 9006, O,S-dimethyl ester phosphoramidothioic acid, Tamaron.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Methamidophos Exposure:

Note: Methamidophos is a cholinesterase inhibitor.

Acute exposure to methamidophos may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur.

METHAMIDOPHOS

The heart rate may decrease following oral exposure or increase following dermal exposure. Chest pain may be noted. Hypotension (low blood pressure) may be noted, although hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

Emergency Life-Support Procedures:

Acute exposure to methamidophos may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methamidophos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methamidophos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

METHAMIDOPHOS

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of methamidophos is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of methamidophos may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BORON TRICHLORIDE

CAS Registry Number: 10294-34-5

Synonyms: Borane, Trichloro-; Boron Chloride; Boron Chloride [BCl3]; Trichloroborane; Trichloroboron

Chemical Formula: BCl_3

Molecular Weight: 117.19

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rat, mouse) 0.10 mg/liter/7 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 54.5°F, 12.5°C (*Merck 1976)

Specific Gravity (H_2O=1): 1.35 at 12/4°C (*Merck 1976)

Vapor Pressure (mmHg): 760 at 12.7°C (*Sax 1979)

Melting Point: -161°F, -107°C (*Merck 1976)

Vapor Density (AIR=1): 4.03 (*Sax 1979)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Decomposes in water to form hydrogen chloride and boric acid (Weast 1980, p. B62)

Appearance and Odor: Colorless, fuming liquid at low temperature (*Merck 1976) with a pungent, irritating odor (*Sax 1979)

BORON TRICHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Rumack 1975 to Present)
Skin: Yes (*Rumack 1975 to Present)
Ingestion: Yes (*Rumack 1975 to Present)

Health Hazards (Acute, Delayed, and Chronic): Strong irritant to tissue. Fumes are corrosive and highly toxic (*Hawley 1977). Boron affects the central nervous system causing depression of circulation as well as shock and coma. May cause severe burns to skin. May result in marked fluid and electrolyte loss and shock (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: It is not flammable (Weiss 1980, p. 171). Use dry chemical, carbon dioxide, or dry sand to extinguish. If large quantities of combustibles are involved, use water in flooding quantities as spray and fog. Use water spray to absorb vapors (Student 1981, p. 74). For large fires use water spray, fog, or foam (DOT 1984, Guide 15). Do not get water on material itself (Student 1981, p. 74).

Special Fire Fighting Procedures: Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible (Student 1981, p. 74). Do not get water inside container. Move container from fire area if you can do so without risk. Stay away from ends of tanks. Spray cooling water on containers that are exposed to flames until well after fire is out. Isolate area until gas has dispersed (DOT 1984, Guide 15).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes. It will react with water or steam to produce heat, and toxic and corrosive fumes (*Sax 1979).

NFPA Flammability Rating: Not Found

BORON TRICHLORIDE

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 171)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Avoid aniline, hexafluorisopropylidene amino lithium, nitrogen dioxide, phosphine, grease, organic matter, and oxygen (Sax 1984, p. 514). Nitrogen peroxide, phosphine, fat or grease react energetically with boron trichloride (*NFPA 1978). It will react with water or steam to produce heat, and toxic and corrosive fumes (*Sax 1979). Oxygen and boron trichloride react vigorously on sparking (*NFPA, 1978). Boron trichloride and aniline react violently in the absence of a coolant or diluent (*Bretherick 1979).

Hazardous Decomposition or Byproducts: In hot water, decomposes to hydrochloric acid and boric acid (*Weast 1979). Fumes and hydrolyzes in moist air to form hydrochloric acid and oily, irritating corrosives (*Encyc Occupat Health and Safety 1971). When heated to decomposition, emits toxic fumes of chlorides (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Manufacture and purification of boron; catalyst in organic reactions; semi-conductors; bonding of iron or steel; purification of metal alloys to remove oxides, nitrides, and carbides (*Merck 1983); chemical intermediate for boron filaments (*SRI); soldering flux; electrical resistors; and extinguishing magnesium fires in heat treating furnaces (*Hawley 1977)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Use water spray to knock down vapors. Do not use water on material itself. Neutralize spilled material with crushed limestone, soda ash or lime. Avoid breathing vapors. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 74). Stop leak if you can do so without risk. Small spills: Flush area with flooding amounts of water. Large spills: Dike far ahead of spill for later disposal. Do not get water inside container. Isolate area until gas has dispersed (DOT 1984, Guide 15).

BORON TRICHLORIDE

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

CPE	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for BORON TRICHLORIDE

(10294-34-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless liquid.

Odor - Pungent, irritating.

Commercial Form - 99% pure liquid, shipped in 50-pound pressure cylinders or tank cars.

Uses - Manufacture and purification of boron, semiconductors, electrical resistors, and metal alloys; iron bonding; catalyst; soldering flux; extinguishing magnesium fires.

Materials to Avoid - Oxygen, water (except for use in emergency life support).

Caution: *Avoid sources of heat including fire. Boron trichloride will liberate toxic and corrosive fumes when heated to decomposition and will generate hydrochloric acid upon contact with water.*

Other Names - Trichloroborane, trichloroboron.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, normal saline, D5W, Ringer's lactate.

BORON TRICHLORIDE

Signs and Symptoms of Acute Boron Trichloride Exposure:

Warning: *Boron trichloride is extremely corrosive. Caution is advised.*

Signs and symptoms of acute ingestion of boron trichloride may be severe and include salivation, intense thirst, difficulty in swallowing, chills, pain, and shock. Oral, esophageal, and stomach burns are common. Vomitus generally has a coffee-ground appearance. The potential for circulatory collapse is high following ingestion of boron trichloride.

Acute inhalation exposure of boron trichloride may result in sneezing, hoarseness, choking, laryngitis, and respiratory tract irritation. Bleeding of nose and gums, ulceration of the nasal and oral mucosa, bronchitis, pneumonia, dyspnea (shortness of breath), chest pain, and pulmonary edema may also occur.

If the eyes have come in contact with boron trichloride, irritation, pain, swelling, corneal erosion, and blindness may result. Dermal exposure may result in dermatitis (red, inflamed skin), severe burns, and pain.

Emergency Life-Support Procedures:

Acute exposure to boron trichloride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to boron trichloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

BORON TRICHLORIDE

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to boron trichloride.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. DO NOT induce vomiting or attempt to neutralize!

3. Rinse mouth with large amounts of water. Inform victims not to swallow this water.

4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

5. Activated charcoal is of no value.

6. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

7. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIALIFOR

CAS Registry Number: 10311-84-9

Synonyms: Phosphorodithioic Acid, S-(2-Chloro-1-(1,3-Dihydro-1,3-Dioxo-2H-Isoindol-2-yl)Ethyl) O,O-Diethyl Ester; Dialifos; Dialiphor; ENT 27320; Hercules 14503; O,O-Diethyl S-(2-chloro-1-phthalimidoethyl) Phosphorodithioate; Phosphorodithioic acid, O,O-Diethyl Ester, S-Ester with N-(2-Chloro-1-Mercaptoethyl)Phthalimide; Phosphorodithioic acid, S-(2-chloro-1-phthalimidoethyl) O,O-Diethyl Ester; S-(2-chloro-1-(1,3-Dihydro-1,3-Dioxo-2H-Isoindol-2-yl)Ethyl) O,O-Diethyl Phosphorodithioate; S-(2-chloro-1-Phthalimidoethyl) O,O-Diethyl Phosphorodithioate; Torak

Chemical Formula: $C_{14}H_{17}ClNO_4PS_2$

Molecular Weight: 393.84

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.001 at 35°C (Worthing 1983, p. 168)

Melting Point: 153-156°F, 67-69°C solid; 144-147°F, 62-64°C recrystallized from toluene and hexane (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

DIALIFOR

SECTION II (continued)

Solubility in Water: Insoluble (*Merck 1976)

Appearance and Odor: White crystalline solid, also reported as oil (*Merck 1976), colorless (*Worthing 1979)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 2216)
Ingestion: Yes (Sax 1984, p. 2216)

Health Hazards (Acute, Delayed, and Chronic): This material can cause serious symptoms and in extreme cases death by respiratory arrest (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Solid, n.o.s.) This material may burn but does not ignite readily. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Solid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Releases nitrogen oxides, sulfur oxides, and phosphorus oxides when heated (Sax 1984, p. 2216)

NFPA Flammability Rating: Not Found

DIALIFOR

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Hydrolyzed by concentrated alkali (*Worthing 1979)

Incompatibility (Materials to Avoid): Readily hydrolyzed by concentrated alkali (*Worthing 1979)

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of sulfur oxides, nitrogen oxides, and phosphorus oxides (Sax 1984, p. 2216)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is a non-systemic insecticide and acaricide (kills beetles, ticks, mites, etc.), effective in controlling many insects and mites common to apples, citrus, grapes, nut trees, potatoes, and vegetables (*Worthing 1979).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do it without risk. 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

DIALIFOR

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Similar to parathion. Symptoms include muscle weakness and twitching, fluid in lungs, nausea, vomiting, stomach cramps, diarrhea, excessive salivation, headache, giddiness, dizziness, tightness in chest, blurring or dimness of vision, tears, constriction of pupils, loss of muscle coordination, slurring of speech, mental confusion, disorientation and drowsiness, difficulty with breathing, convulsions, and coma (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Solid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHACROLEIN DIACETATE

CAS Registry Number: 10476-95-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 331) 2-Propene-1,1-Diol, 2-Methyl-, Diacetate; Acetic Acid, 2-Methyl-2-Propene-1,1-Diol Diester

Chemical Formula: $C_8H_{12}O_4$

Molecular Weight: 172.20

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} skin (rabbit) 44 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 191°C at 760 mmHg (Aldrich 1986, p.190)

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

METHACROLEIN DIACETATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 84)
Skin: Yes (Sax 1984, p. 84)
Ingestion: Yes (Sax 1984, p. 84)

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits acrid smoke and irritating fumes (Sax 1984, p. 84).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits acrid smoke and irritating fumes (Sax 1984, p. 84).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

METHACROLEIN DIACETATE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
DOT 1984
NFPA 1978
Encyc Occupat Health and Safety 1983
Student 1981
Weiss 1980
CHRIS 1978
Clayton and Clayton 1981-82
Arena 1979
Buchel 1983
Gosselin 1984
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Doull 1980

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PARIS GREEN

CAS Registry Number: 12002-03-8

Synonyms: Copper, bis(Acetato)Hexametaarsenitotetra-; (Acetato) Trimetaarsenitodicopper; (Acetato-O)(Trimetaarsenito)Dicopper; Basle Green; CI 77410; CI Pigment Green 21; Copper Acetate Arsenite; Copper Aceto-Arsenite; Copper (II) Acetate Meta-Arsenite; Cupric Acetoarsenite; Emerald Green; ENT 884; French Green; Genuine Paris Green; Imperial Green; King's Green; Meadow Green; Mineral Green; Mitis Green; Moss Green; Mountain Green; Neuwied Green; New Green; Ortho P-G Bait; Parrot Green; Patent Green; Powder Green; Schweinfurt Green; Schweinfurtergrun; Schweinfurth Green; Sowbug and Cutworm Bait; Sowbug Cutworm Control; Swedish Green; Vienna Green; Wuerzberg Green; Zwickau Green

Chemical Formula: Complex Composition (*Gosselin 1984); Specifications usually require approximately $C_4H_6As_6Cu_4O_{16}$ (*Spencer 1982)

Molecular Weight: For Chemical Formula (usually contains some water): 1013.78 (NIOSH/RTECS 1983, p. 958)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 22 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 100 (pounds) (statutory); 1 (pounds) (proposed)

Section 313 Listed (Yes or No): In Arsenic Compounds and Copper Compounds categories

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes (Weiss 1980, p. 265)

Specific Gravity (H_2O=1): Estimated as greater than 1.1 at 68°F, 20°C (*CHRIS 1978)

Vapor Pressure (mmHg): Not Found

PARIS GREEN

SECTION II (continued)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Weast 1983)

Appearance and Odor: Emerald green, crystalline powder (*Merck 1983); odorless (*CHRIS 1978)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Arsenic and compounds) TWA 0.01 mg/m^3, as arsenic (NIOSH 1987, p.54)

ACGIH TLV: (Arsenic and soluble compounds) 0.2 mg/m^3, as arsenic (ACGIH 1986-87, p. 10)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Morgan 1976)
Skin: Yes (*Morgan 1976)
Ingestion: Yes (*Morgan 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose for humans is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150-lb. person (*Gosselin 1984). Some absorption may occur through the skin and by inhalation, but most poisonings result from ingestion (*Morgan 1976). It may cause eye and respiratory tract irritation (*Grant 1974). Industrial exposure may cause dermatitis (*Hayes 1982).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not Flammable (Weiss 1980, p. 265)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 53). Use of water may result in generation of toxic fumes (see Section IV below).

PARIS GREEN

SECTION IV (continued)

Special Fire Fighting Procedures: Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: Poisonous, volatile arsenic oxide may be formed in fires (*CHRIS 1978). Exposure of dust to flame may cause explosion (*Rumack 1975 to Present).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Merck 1983)

Conditions to Avoid: Unstable in acids and bases (*Merck 1983)

Incompatibility (Materials to Avoid): Can react vigorously with oxidizing materials. Emits highly toxic fumes on contact with acid or acid fumes (*Sax 1975).

Hazardous Decomposition or Byproducts: When heated, it emits highly toxic fumes (*Sax 1975); decomposes readily in the presence of water and carbon dioxide to yield phytotoxic arsenical compounds (*Spencer 1982).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 265)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used primarily as an insecticide (*Clarke 1981); it may be used as a wood preservative and a pigment, particularly for ships and submarines (*Merck 1983), and also finds use as an anthelmintic (*Rossoff, 1974).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Stay upwind; keep out of low areas. Do not touch spilled material. Take up small spills with sand or other noncombustible absorbent material and place into containers for later disposal. For small dry spills, use clean shovel to place material in clean, dry container. For large spills, dike far ahead of spill for later disposal (DOT 1984, Guide 53). Use water spray to knock down dust (Weiss 1980, p. 265).

PARIS GREEN

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms usually appear 1/2 to 1 hour after ingestion, but may be delayed. Symptoms include a sweetish, metallic taste and garlicky odor; difficulty in swallowing; abdominal pain; vomiting and diarrhea; dehydration; rapid heart beat; dizziness and headache; and eventually coma, sometimes convulsions, and death (*Gosselin 1984).

Emergency and First Aid Procedures: Remove contaminated clothing and shoes. For ingestion, give copious quantities of water and induce repeated vomiting. If eyes have been exposed, flush with water for 15 minutes. If there has been skin contact, wash thoroughly with soap and water (Weiss 1980, p. 265).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MANGANESE, TRICARBONYL METHYLCYCLOPENTADIENYL

CAS Registry Number: 12108-13-3

Synonyms: Methylcyclopentadienyl Manganese Tricarbonyl; (Methylcyclopentadienyl)Manganese Tricarbonyl; (Methylcyclopentadienyl)Tricarbonylmanganese; 2-Methylcyclopentadienylmanganese Tricarbonyl; AK-33X; Antiknock-33; CI-2; Combustion Improver-2; Manganese, Tricarbonyl((1,2,3,4,5-eta)-1-Methyl-2,4-Cyclopentadien-1-yl)-; Manganese, Tricarbonyl(Methyl-pi-Cyclopentadienyl)-; Methylcymantrene; MMT; pi-Methylcyclopentadienylmanganese Tricarbonyl; Tricarbonyl(2-Methylcyclopentadienyl) Manganese; Tricarbonyl(eta(5)-Methylcyclopentadienyl)Manganese; Tricarbonyl (Methyl-pi-Cyclopentadienyl)Manganese; Tricarbonyl(Methylcyclopentadienyl) Manganese

Chemical Formula: $C_9H_7MnO_3$

Molecular Weight: 218.10

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.059 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Manganese Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 449°F, 232°C (*ACGIH 1980)

Specific Gravity (H_2O=1): 1.39 at 20°C (*ACGIH 1980)

Vapor Pressure (mmHg): 7.3 at 100°C (*ACGIH 1980)

Melting Point: 34°F, 1°C (Weiss 1980, p. 607)

Vapor Density (AIR=1): Not Found

MANGANESE, TRICARBONYL METHYLCYCLOPENTADIENYL

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*ACGIH 1980)

Appearance and Odor: A dark orange liquid with a faintly pleasant smell (*ACGIH 1980).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Manganese compounds) Ceiling 5 mg/m^3, as manganese (NIOSH 1987, p. 150)

ACGIH TLV: TWA 0.1 mg/m^3, as manganese (skin) (ACGIH 1986-87, p. 22)

IDLH: (Manganese compounds) 10,000 mg/m^3, as manganese (NIOSH 1987, p. 150)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*ACGIH 1980)
Skin: Yes (*ACGIH 1980)
Ingestion: Yes (*ACGIH 1980)

Health Hazards (Acute, Delayed, and Chronic): In concentrated form this compound is highly toxic by all routes of exposure. Approximately 5-15 ml, when spilled on the hand and wrist of a worker, produced toxic effects within 3-5 minutes (*ACGIH 1980).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 230°F, 110°C (CC) (*ACGIH 1980)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Extinguish with water, dry chemicals, foam, or carbon dioxide. Wear goggles and self-contained breathing apparatus (Weiss 1980, p. 607).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, this compound emits toxic fumes of carbon monoxide (Sax 1984, p. 1733).

NFPA Flammability Rating: Not Found

MANGANESE, TRICARBONYL METHYLCYCLOPENTADIENYL

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 607)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits carbon monoxide when heated to decomposition (Sax 1984, p. 1733).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 607)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This compound is used as a smoke abater additive in fuels (*ACGIH 1980), a gasoline additive in antiknock mixes, and a combustion improver in distillate fuels and fuel oils (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Stop discharge, if possible; isolate and remove discharged material (Weiss 1980, p. 607). Large spills can be cleaned up using JP-4L or JP-5 (jet engine fuels). Isopropyl alcohol may be used to clean up moderate spills, while methyl ethyl ketone should be used for cleaning small spills and quick disconnects (*ACGIH 1980). Avoid contact with liquid; keep people away. Call fire department and notify local health and pollution control agencies (Weiss 1980, p. 607).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This compound is moderately irritating to the eyes. Giddiness, "thick tongue," nausea, and headache were reported to occur after skin exposure. Human exposure data are limited; the primary

MANGANESE, TRICARBONYL METHYLCYCLOPENTADIENYL

SECTION IX (continued)

site of action is reported to be the central nervous system (ACGIH 1980, p. 272).

Emergency and First Aid Procedures: Remove victim from exposure. Exposed clothing should be removed, and exposed areas of the body should be washed twice with soap and water. If eyes are exposed flush with copious amounts of water for at least 15 minutes. Induce vomiting unless patient is comatose, convulsing, or has lost gag reflex. Get medical attention following all exposures to this compound (Weiss 1980, p. 607; *Rumack 1975 to Present).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TERBUFOS

CAS Registry Number: 13071-79-9

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 141): Phosphorodithioic Acid, O,O-Diethyl-S-(((1,1-Dimethylethyl)thio)Methyl)-Ester; AC 92100; S-((Tert-Butylthio)Methyl)O,O-Diethylphosphorodithioate; Counter; Counter 15G Soil Insecticide; S-(((1,1-Dimethylethyl)Thio)Methyl)-O,O-Diethyl Phosphorodithioate; Phosphorodithioic Acid S-((Tert-Butylthio)Methyl) O,O-Diethyl Ester; Phosphorodithioic Acid S-(((1,1-Dimethylethyl)Thio)Methyl) O,O-Diethyl Ester

Chemical Formula: $C_9H_{21}O_2PS_3$

Molecular Weight: 288.45

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 1.6 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 156°F, 69°C at 0.01 mmHg (Merck 1983, p. 1310)

Specific Gravity (H_2O=1): 1.105 at 24°C (Merck 1983, p. 1310)

Vapor Pressure (mmHg): 0.0003 mmHg at 25°C (Worthing 1983, p. 512)

Melting Point: -20.6°F, -29.2°C (Merck 1983, p. 1310)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 15 ppm (Farm Chemicals Handbook 1978, p. C62)

TERBUFOS

SECTION II (continued)

Appearance and Odor: Technical product: clear, colorless to pale yellow liquid (Merck 1983, p. 1310).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Farm Chemicals Handbook 1984, p. C62)
Skin: Yes (Farm Chemicals Handbook 1984, p. C62)
Ingestion: Yes (Farm Chemicals Handbook 1984, p. C62)

Health Hazards (Acute, Delayed, and Chronic): This material may be fatal if swallowed, inhaled, or absorbed through the skin. Repeated inhalation or skin contact may progressively increase susceptibility to poisoning (Farm Chemicals Handbook 1984, p. C62).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 190°F, 88°C (TOC) (Merck 1983, p. 1310)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This is a liquid organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1620). For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This is a liquid organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1620). Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: This is a liquid organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1620). Fire may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

TERBUFOS

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Farm Chemicals Handbook 1984, p. C62)

Conditions to Avoid: Hydrolyzes under alkaline conditions (Farm Chemicals Handbook 1984, p. C62).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a soil insecticide (Merck 1983, p. 1310).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This is a liquid organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1620). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

TERBUFOS

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TERBUFOS

(13071-79-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Clear, colorless liquid.

Commercial Form - Pale yellow liquid.

Use - Insecticide.

Other Names - AC 92100; Counter; S-((tert-butylthio)methyl) O,O-diethylphosphorodithioate.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Terbufos Exposure:

Note: Terbufos is a cholinesterase inhibitor.

Acute exposure to terbufos may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Chest pain may be noted. Hypotension (low blood pressure) may be noted, although hypertension (high blood pressure) is not uncommon. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

TERBUFOS

Emergency Life-Support Procedures:

Acute exposure to terbufos may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to terbufos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to terbufos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

TERBUFOS

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of terbufos is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of terbufos may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHAMIDON

CAS Registry Number: 13171-21-6

Synonyms: Phosphoric Acid, Dimethyl Ester, Ester with 2-Chloro-N,N-Diethyl-3-Hydroxycrotonamide; 1-Chloro-Diethylcarbamoyl-1-Propen-2-yl Dimethyl Phosphate; 2-(N,N-Diethylcarbamoyl)-1-Methylvinyl Phosphate; 2-Chloro-2-Diethylcarbamoyl-1-Methylvinyl Dimethyl Phosphate; 2-Chloro-2-Diethylcarbamyl-1-Methylvinyl Dimethyl Phosphate; 2-Chloro-3-(Diethylamino)-1-Methyl-3-Oxo-1-Propenyl Dimethyl Phosphate; 2-Chloro-N,N-Diethyl-3-Hydroxycrotonamide Dimethyl Phosphate; Crotonamide, 2-Chloro-N,N-Diethyl-3-Hydroxy-, Dimethyl Phosphate; Dimecron; Dimecron 100; Dimecron 50; Dimecron-20; Dimethyl Phosphate of 2-Chloro-N,N-Diethyl-3-Hydroxycrotonamide; Dixon; Famfos; Merkon; N,N-Diethyl 2-Chloro-3-Dimethylphosphate Crotonamide; NCI-C0058; Phosphamidone; Phosphoric Acid, 2-Chloro-3-(Diethylamino)-1-Methyl-3-Oxo-1-Propenyl Dimethyl Ester; Sundaram 1975

Chemical Formula: $C_{10}H_{19}ClNO_5P$

Molecular Weight: 299.70

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.03 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 324°F, 162°C at 1.5 mmHg (*Martin and Worthing 1974)

Specific Gravity (H_2O=1): 1.2132 at 25°C/4°C (*Martin and Worthing 1974)

Vapor Pressure (mmHg): 0.000025 at 20°C (*Martin and Worthing 1974)

Melting Point: -49°F, -45°C (*Merck 1976)

PHOSPHAMIDON

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Miscible (*Merck 1976)

Appearance and Odor: Pale yellow oily liquid (*Farm Chemicals Handbook 1975), faint odor (*Martin and Worthing 1974).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: ADI in connection with residues of pesticides in foods -- 0.001 mg/kg (*Hayes 1975).

Routes of Entry: **Inhalation:** Yes (*Hawley 1977)
Skin: Yes (*Hawley 1977)
Ingestion: Yes (*Hawley 1977)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose for humans is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150-lb person (*Gosselin 1976). It is a cholinesterase inhibitor (*Hawley 1977).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

PHOSPHAMIDON

SECTION IV (continued)

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Container may explode in heat of fire (DOT 1984, Guide 55). Heat may cause decomposition and evolution of highly toxic fumes of phosphorus oxides and chlorides (*Sax 1975).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes, in neutral and acid media (*Martin and Worthing 1974)

Conditions to Avoid: Hydrolyzes in alkali (*Martin and Worthing 1974).

Incompatibility (Materials to Avoid): Hydrolyzes in alkali (*Martin and Worthing 1974)

Hazardous Decomposition or Byproducts: Decomposes above 320°F, 160°C (*Sunshine 1969); may emit highly toxic fumes of phosphorus oxides and chlorides (*Sax 1975).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is an insecticide for citrus, cotton, and deciduous fruit and nuts (*SRI). It is also an acaricide (*Farm Chemicals Handbook 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

PHOSPHAMIDON

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for PHOSPHAMIDON

(13171-21-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless to pale yellow liquid.

Odor - Faint.

Commercial Form - Pale yellow, oily liquid.

Use - Pesticide.

Caution: *Explosion potential is high. Containers may explode in heat of fire. Highly toxic phosphorus oxides and chlorides may be emitted when phosphamidon is heated to decomposition. Avoid sources of extreme heat.*

Other Names - Apamidon, 2-chloro-2-diethylcarbamoyl-1-methylvinyl dimethyl phosphate, Ciba 570, Dimecron, Dixon, Famfos, Merkon, Sundaram 1975.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

PHOSPHAMIDON

Signs and Symptoms of Acute Phosphamidon Exposure:

Note: Phosphamidon is a cholinesterase inhibitor.

Acute exposure to phosphamidon may produce pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may decrease following oral exposure or increase following dermal exposure. Hypotension (low blood pressure) may occur, although hypertension (high blood pressure) is not uncommon. Chest pain may be noted.

Respiratory effects include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

Emergency Life-Support Procedures:

Acute exposure to phosphamidon may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to phosphamidon.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to phosphamidon.

PHOSPHAMIDON

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of phosphamidon is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of phosphamidon may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

PHOSPHAMIDON

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ETHOPROPHOS

CAS Registry Number: 13194-48-4

Synonyms: Phosphorodithioic Acid, O-Ethyl S,S-Dipropyl Ester; Mocap; ENT 27,318; Ethoprop; Jolt; O-Ethyl S,S-Dipropyl Dithiophosphate; O-Ethyl S,S-Dipropyl Phosphorodithioate; O-Ethyl S,S-Dipropylphosphorodithioate; Prophos; Rovokil; V-C Chemical V-C 9-104; VC 9-104; VC9-104

Chemical Formula: $C_8H_{19}O_2PS_2$

Molecular Weight: 242.36

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} dermal (rabbit) 26 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 187-196°F, 86-91°C at 0.2 mmHg (*Worthing 1979)

Specific Gravity (H_2O=1): 1.094 at 20°C (*Worthing 1979)

Vapor Pressure (mmHg): 0.00035 at 26°C (*Worthing 1979)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 750 mg/liter (*Worthing 1979)

Appearance and Odor: Clear, pale yellow liquid (*Worthing 1979).

ETHOPROPHOS

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): This material is extremely toxic; the probable oral lethal dose for humans is 5-50 mg/kg, or between 7 drops and 1 teaspoonful for a 150 lb. person. It is a cholinesterase inhibitor which affects the nervous system (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes, in water (*Worthing 1979)

ETHOPROPHOS

SECTION V (continued)

Conditions to Avoid: Hydrolyzed in alkali (*Worthing 1979).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide and nematocide on a number of crops (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small spills: take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

ETHOPROPHOS

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms are similar to parathion and may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, weakness, muscle twitching, difficult breathing, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM SELENATE

CAS Registry Number: 13410-01-0

Synonyms: (NIOSH/RTECS 1983 SYNONYMS, VOLUME 3, p. 580) Selenic Acid, Disodium Salt; Disodium Selenate; P-40; Sel-Tox SS02 and SS-20; Selenic Acid (H2SeO4), Disodium Salt

Chemical Formula: Na_2SeO_4

Molecular Weight: 188.94

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 2.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Selenium Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 3.098 (Sax 1984, p. 1254)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble (Merck 1983, p. 1241)

Appearance and Odor: Colorless rhombic crystals (Sax 1984, p. 1254)

SODIUM SELENATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Selenium compounds) 0.2 mg/m^3, as selenium (NIOSH 1987, p.206)

ACGIH TLV: (Selenium compounds) TWA 0.2 mg/m^3, as selenium (ACGIH 1986-87, p. 29)

IDLH: Not Found

Other Limits Recommended: IDLH for selenium compounds 100 mg/m^3, as selenium (NIOSH 1987, p. 206)

Routes of Entry: **Inhalation:** Yes (DOT 1984, Guide 53)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1254)

Health Hazards (Acute, Delayed, and Chronic): Causes damage to liver and kidneys. Resembles arsenic in its effects (Sax 1984, p. 1254).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Dry chemical, carbon dioxide, water spray, fog, or foam. Move container from fire area if it can be done without risk (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing (DOT 1984, Guide 53).

Unusual Fire and Explosion Hazards: Fire may produce irritating or poisonous gas (DOT 1984, Guide 53).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposing heat (Sax 1984, p. 1254)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits toxic selenium and sodium oxide fumes when heated to decomposition (Sax 1984, p. 1254).

SODIUM SELENATE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticide in some horticultural applications (Merck 1983, p. 1241).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid breathing dust (see Section III above). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Selenium Compounds) Garlic odor of breath is common. Pallor, nervousness, depression, and digestive disturbances. Inorganic selenium compounds can cause dermatitis (Sax 1984, p. 2390).

SODIUM SELENATE

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air. Remove contaminated clothing and shoes at site. In case of contact, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- GALLIUM TRICHLORIDE

CAS Registry Number: 13450-90-3

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 362) Gallium(3+) Chloride

Chemical Formula: $GaCl_3$

Molecular Weight: 176.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (rat) 0.191 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 394°F, 201.3°C (Weast 1978, p. B-119)

Specific Gravity (H_2O=1): 2.47 at 25°C/4°C (Weast 1978, p. B-119)

Vapor Pressure (mmHg): Not Found

Melting Point: 172°F, 78°C (Sax 1984, p. 1470)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Very soluble (Weast 1978, p. B-119); very soluble in either hot or cold water (Clayton and Clayton 1981-82, p. 1632)

Appearance and Odor: Colorless needles (Sax 1984, p. 1470)

GALLIUM TRICHLORIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p.1470)
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Gallium Compounds) In view of the toxicity of gallium and its compounds, as shown by experiments, all persons involved in work with these substances should undergo periodic medical examinations, during which special attention should be paid to the condition of the liver, respiratory organs, and skin (Encyc Occupat Health and Safety 1983, pp. 938-939).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposes upon sufficient heating (Sax 1984, p. 1470)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits toxic chloride fumes when heated to decomposition (Sax 1984, p. 1470)

GALLIUM TRICHLORIDE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as a raw material in the production of metallic gallium (Hawley 1981, p. 488); and in the processing of monocrystal semi-conductor compounds (Encyc Occupat Health and Safety 1983, p. 938).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact.

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes (DOT 1984, Guide 53).

GALLIUM TRICHLORIDE

COMMENTS

Other sources checked but no information found:

ACGIH 1983
Merck 1983
DASE 1980
NIOSH/OSHA 1978
Hayes 1982
Doull 1980
Gosselin 1984
DOT 1984
NFPA 1984
Student 1981
Weiss 1980
Farm Chemicals Handbook 1984
Verschueren 1983

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- NICKEL CARBONYL

CAS Registry Number: 13463-39-3

Synonyms: Nickel Carbonyl [Ni(CO)4], (T-4)-; Nickel Tetracarbonyl; Tetracarbonyl Nickel; UN 1259

Chemical Formula: C_4NiO_4

Molecular Weight: 170.75

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.067 mg/liter/30 minutes (*NIOSH/RTECS 1985)

TPQ: 1 (pounds)

RQ: 1 (pounds) (statutory); 10 (pounds) (proposed)

Section 313 Listed (Yes or No): In Nickel Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 109°F, 43°C (*Merck 1983)

Specific Gravity (H_2O=1): 1.318 at 17°C (*Merck 1983)

Vapor Pressure (mmHg): 400 at 25.8°C (*Hawley 1981)

Melting Point: -2.2°F, -19.3°C (*Merck 1983)

Vapor Density (AIR=1): 5.89 (NFPA 1984, p. 325M-74)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Soluble in about 5000 parts water free from air (*Merck 1983)

Appearance and Odor: Nickel carbonyl exists as a gas or as a colorless liquid (*Merck 1983; *Hamilton and Hardy 1974). It has a peculiar sooty odor (*Clayton and Clayton 1982).

NICKEL CARBONYL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.007 mg/m^3 (0.001 ppm) (NIOSH 1987, p. 172)

ACGIH TLV: TWA 0.35 mg/m^3 (0.05 ppm), as nickel (*ACGIH 1983)

IDLH: 0.001 ppm (NIOSH/OSHA 1978, p. 138)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*DOT 1984)
Skin: Yes (*DOT 1984)
Ingestion: Yes (*DOT 1984)

Health Hazards (Acute, Delayed, and Chronic): Probable oral lethal dose for a human is between 50 and 500 mg/kg, between one teaspoon and one ounce per 150 lb. person (*Gosselin 1976). Nickel carbonyl has also been estimated to be lethal in man at atmospheric exposures of 30 ppm for 20 minutes (*Doull 1980). Autopsies show congestion, collapse, and tissue destruction, as well as hemorrhage in the brain (*Hamilton and Hardy 1974). Dermatitis, recurrent asthmatic attacks, and increased number of white blood cells (eosinophils) in respiratory tract are acute health hazards (*DOT 1984). Nickel carbonyl is poisonous. It can be fatal if inhaled, swallowed, or absorbed through skin. Vapors may cause irritation, congestion, and edema of lungs (*Merck 1983).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Less than -18°C (no method given) (*NFPA 1978)
Flammable Limits: Flammable and burns with a yellow flame (*Clayton and Clayton 1982)
LEL: 2% (NIOSH/OSHA 1978, p. 138)
UEL: Not Found

Extinguishing Methods: Use water, alcohol foam, carbon dioxide, dry chemical (*NFPA 1978). Use water in flooding quantities as fog. Solid streams of water may be ineffective (Student 1981, p. 363).

Special Fire Fighting Procedures: Material is too dangerous to health to expose fire fighters. A few whiffs of the vapor could cause death. If liquid or vapor penetrates fire fighter's protective gear it will cause fatality. Normal full protective gear available to the average fire department will not provide adequate inhalation or skin protection (*NFPA 1978).

Unusual Fire and Explosion Hazards: Vapor forms explosive mixtures with air. Vapor is heavier than air and may travel a considerable distance to source of ignition and flash back (*NFPA 1978). Liquid may explode when heated under confinement (NFPA 1984, p. 49-66). Vapor explosion and poison hazard indoors, outdoors, or in sewers. Runoff to sewer may create fire and explosion (*DOT 1984).

NICKEL CARBONYL

SECTION IV (continued)

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: Unstable: Yes (Weiss 1980, p. 646)
Stable:

Conditions to Avoid: Contact with air (*Clayton and Clayton 1981-82). Contact with heat, acid, or acid fumes (*Sax 1979). Ignition sources and vapors entering a confined space (*NIOSH/OSHA 1981).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: May explode at 68°F (20°C) in presence of air or oxygen (*Clayton and Clayton 1981-82). Emits highly toxic fumes when heated or on contact with acid or acid fumes (*Sax 1979).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Nickel carbonyl is used to nickel-coat steel and other metals (Student 1981, p. 363). It is also used in the electronics industry (*Doull 1980).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Material is extremely dangerous and may explode. Do not inhale vapors or allow material to contact skin (see Sections III, IV, and V above). Remove all ignition sources. Ventilate area of spill. Atomize large quantities in a combustion chamber equipped with an effluent gas cleaning device. Nickel carbonyl should not be allowed to enter a confined space (such as a sewer) because of the possibility of an explosion (*NIOSH/OSHA 1981). Isolate hazard area and deny entry. Stay upwind and out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors (*DOT 1984).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

NICKEL CARBONYL

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED*
CPE	GOOD/LIMITED*
PVC	GOOD/LIMITED*

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for NICKEL CARBONYL

(13463-39-3)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - Gas or colorless liquid.

Odor - Musty, irritating.

Commercial Form - Liquid in cylinders pressurized with carbon monoxide.

Uses - Electronics industry, nickel-coated metals, nickel powder.

Materials to Avoid - Oxidizers, acids, halogens.

Other Names - Nickel tetracarbonyl.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, dimercaprol, disulfiram, penicillamine.

Signs and Symptoms of Acute Nickel Carbonyl Exposure:

Warning: *Effects usually occur in two stages: immediate and delayed. Delayed effects may begin hours to days after exposure. Caution is advised.*

Acute exposure to nickel carbonyl may result in dizziness, giddiness, weakness, convulsions, hallucinations, delirium, nausea, vomiting, and diarrhea. Following inhalation, respiration will initially be rapid, accompanied by a nonproductive cough, and followed by pain and tightness in the chest.

NICKEL CARBONYL

Pulmonary edema, cerebral edema, and hepatic (liver) degeneration may also occur. Vapor is irritating to the eyes, nose, and throat.

Nickel contact dermatitis is the most common reaction to nickel carbonyl. Nickel itch may begin with a burning sensation and itching, often followed by erythema (redness) and nodular eruptions. Liquid nickel carbonyl will burn the skin and eyes.

Emergency Life-Support Procedures:

Acute exposure to nickel carbonyl may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to nickel carbonyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to nickel carbonyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

NICKEL CARBONYL

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- IRON, PENTACARBONYL-

CAS Registry Number: 13463-40-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p.547-548) Iron Carbonyl; Pentacarbonyliron

Chemical Formula: $Fe(CO)_5$

Molecular Weight: 195.90

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.044 mg/liter (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 216.8°F, 102.8°C at 749 mmHg (Weast 1979, p. B-126)

Specific Gravity (H_2O=1): 1.457 at 21°C (Weast 1979, p. B-126)

Vapor Pressure (mmHg): 40 at 30.3°C (Sax 1984, p. 2125)

Melting Point: -5.8°F, -21°C (Weast 1979, p. B-126)

Vapor Density (AIR=1): 6.74 (NFPA 1984, p. 325M-60)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1979, p. B-126)

Appearance and Odor: Viscous yellow liquid (Weast 1979, p. B-126)

IRON, PENTACARBONYL-

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 0.8 mg/m^3 (0.1 ppm); STEL 1.6 mg/m^3 (0.2 ppm) (ACGIH 1985, p. 21)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Hawley 1981, p. 572)
Skin: Yes (Hawley 1981, p. 572)
Ingestion: Yes (Hawley 1981, p. 572)

Health Hazards (Acute, Delayed, and Chronic): Toxicity of this compound is high via all routes of entry. Cyanosis (bluish discoloration of skin) and circulatory collapse may occur after exposure. Death may result. Pneumonitis and injury to the kidneys, liver, and central nervous system may also occur (Merck 1983, p. 736; Sax 1984, p. 2125).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 5°F, -15°C (Hawley 1981, p. 572)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material is incompatible with water (Sax 1984, p. 2125). Use dry chemical, carbon dioxide, water spray, or foam for small fires, and water spray, fog, or foam for large fires. Move material from fire area if this can be done without risk. Dike fire control water for later disposal (DOT 1984, Guide 28).

Special Fire Fighting Procedures: Isolate hazard area and deny entry. Stay upwind and keep out of low areas. Isolate area for 1/2 mile in all directions if tank car or truck is involved in fire. Wear positive pressure breathing apparatus and special protective clothing. Cool containers exposed to flames with water until fire is out. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire (DOT 1984, Guide 28).

Unusual Fire and Explosion Hazards: This material may be ignited by heat, sparks, or flames. Vapors may travel to ignition source and flash back. Containers may explode in the heat of fire. Evolution of carbon monoxide may create a poison hazard. This material presents a vapor explosion and poison hazard indoors, outdoors, or in sewers (DOT 1984, Guide 28).

NFPA Flammability Rating: 3

IRON, PENTACARBONYL-

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (Hawley 1981, p. 572)
Stable:

Conditions to Avoid: Decomposes in acids and alkalies (Hawley 1981, p. 572). Protect from light and air (Merck 1983, p. 736).

Incompatibility (Materials to Avoid): Acetic acid, water, nitrogen oxide, transition metal halides, and zinc (Sax 1984, p. 2125), and it burns in air (Merck 1983, p. 736).

Hazardous Decomposition or Byproducts: Evolves carbon monoxide on exposure to air or to light (Hawley 1981, p. 572). Emits carbon monoxide when heated to decomposition (Sax 1984, p. 2125).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Iron carbonyl is used as a catalyst in organic reactions; to make carbonyl iron which is used in high frequency coils for the radio and television industry; and as an anti-knock agent in motor fuels (Merck 1983, p. 736).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not breathe vapors (see Section III above). Shut off or remove ignition sources in hazard area. Do not touch spilled material. Stop leak if this can be done without risk. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material and place into containers for later disposal. Dike far ahead of large spills for later disposal (DOT 1984, Guide 28).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Inhalation may result in dizziness, nausea, and vomiting; if exposure continues, unconsciousness will follow. Delayed reactions include chest pain, cough, and difficult breathing (Sax 1984, p. 2125).

IRON, PENTACARBONYL-

SECTION IX (continued)

Emergency and First Aid Procedures: Move victim to fresh air and call emergency medical care. If victim is not breathing, give artificial respiration; if breathing is difficult, give oxygen. Remove and isolate contaminated clothing at site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature. Keep victim under observation since effects may be delayed (DOT 1984, Guide 28).

COMMENTS

Sources searched but no information found:

DASE 1980
Weiss 1980
Clayton and Clayton 1981-82
Gilman 1985
Gosselin 1981
OSHA 1984
Hayes 1982
Student 1981
Doull 1980
NIOSH/OSHA 1978

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TELLURIUM

CAS Registry Number: 13494-80-9

Synonyms: Aurum Paradoxum; Metallum Problematum

Chemical Formula: Te

Molecular Weight: 127.60

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 1814°F, 989.9°C (amorphous powder) (*Merck 1976); 2534°F, 1390°C (crystalline solid) (Weast 1984, p. B-146)

Specific Gravity (H_2O=1): 6.24 (Weiss 1980, p. 1158)

Vapor Pressure (mmHg): 1 at 520°C (Sax 1984, p. 2501)

Melting Point: 842°F, 449.8°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Merck 1983, p. 8970)

Appearance and Odor: Grayish-white, lustrous, brittle, crystalline solid; dark-gray to brown, amorphous powder with metal characteristics (*Merck 1976).

TELLURIUM

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.1 mg/m^3 (NIOSH/OSHA 1978, p. 172-173)

ACGIH TLV: TWA 0.1 mg/m^3 (*ACGIH 1980)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (NIOSH/OSHA 1978, p. 172-173)
Skin: Yes (NIOSH/OSHA 1978, p. 172-173)
Ingestion: Yes (NIOSH/OSHA 1978, p. 172-173)

Health Hazards (Acute, Delayed, and Chronic): Causes central nervous system depression (Merck 1983, p. 1307). Moderate skin and eye irritant (Weiss 1980, p. 1158). Tellurium is capable of doing harm within the body by replacing the essential element sulfur (Arena 1979, p. 269).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Use water spray (Weiss 1980, p. 1158). Tellurium will burn only slowly in air (Clayton and Clayton 1981-82, p. 2137).

Special Fire Fighting Procedures: Straight water streams will scatter molten tellurium oxide. Wear goggles, rubber gloves, and proper respirator with filter (Weiss 1980, p. 1158).

Unusual Fire and Explosion Hazards: A finely divided suspension of elemental tellurium in air will explode (*NFPA 1978). Burning tellurium produces toxic tellurium oxide gas (Weiss 1980, p. 1158).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Encyc Occupat Health and Safety 1971)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Solid sodium (*NFPA 1978); halogens, interhalogens, metals, hexalithium disilicide (Sax 1984, p. 2501). Reacts with nitric acid; reacts with concentrated sulfuric acid forming a red solution. Dissolves in potassium hydroxide in the presence of air with formation of deep red solution; combines with halogens (Merck

TELLURIUM

SECTION V (continued)

1983, p. 1307). Antimony and chlorine trifluoride; chlorine trifluoride reacts vigorously with tellurium producing flame. Fluorine and tellurium react with incandescence. Lithium silicide attacks tellurium with incandescence. Reaction with zinc is accompanied by incandescence (same potential with cadmium, only hazard is less). A vigorous reaction results when liquid tellurium is poured over solid sodium (*NFPA 1978).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of tellurium oxide (Sax 1984, p. 2501).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Coloring agent in chinaware, porcelains, enamels, glass; producing black finish on silverware; semiconductor devices and research; manufacturing special alloys of marked electrical resistance (*Merck 1976). Improves mechanical properties of lead; powerful carbide stabilizer in cast iron (*Encyc Occupat Health and Safety 1971); tellurium vapor in "daylight" lamps, vulcanization of rubber (*Clayton and Clayton 1981-82). Blasting caps (*Weast 1979). Semiconductor research (Merck 1983, p. 1307).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill or leak; collect spilled material in the most convenient and safe manner and deposit in sealed containers for reclamation or for disposal in a secured sanitary landfill. Liquids containing tellurium should be absorbed in vermiculite, dry sand, earth or a similar material (*NIOSH/OSHA 1981).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for TELLURIUM

(13494-80-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Silvery or grayish-white lustrous solid, dark gray to brown amorphous powder.

Commercial Forms - Powder, sticks, slabs, and tablets.

Uses - Coloring agent in chinaware, porcelains, enamels, glass, black finish on silver, semiconductors, manufacturing special alloys of marked electrical resistance, carbide stabilizer in cast iron, lamps, vulcanization of rubber, blasting caps, catalyst.

Materials to Avoid - Acids.

Caution: *When heated to decomposition, toxic fumes of tellurium oxide will be emitted. Avoid sources of extreme heat.*

Other Names - Aurum paradoxum, metallum problematum.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate.

Signs and Symptoms of Acute Tellurium Exposure:

Signs and symptoms of acute exposure to tellurium may include drowsiness, malaise, lassitude, weakness, and dizziness. Gastrointestinal symptoms may include nausea, vomiting, anorexia, and constipation.

TELLURIUM

A metallic taste, garlicky breath, and profuse sweating may be noted. Kidney damage, liver injury, and pulmonary effects may also occur. Dermal exposure may result in dermatitis (red, inflamed skin).

Emergency Life-Support Procedures:

Acute exposure to tellurium may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to tellurium.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to tellurium.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas THOROUGHLY with soap and water.

TELLURIUM

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of tellurium is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SALCOMINE

CAS Registry Number: 14167-18-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 950) Cobalt, N,N'-Ethylenebis(Salicylideneiminato)-; bis(Salicylaldehyde)Ethylenediimine Cobalt(II); Cobalt, ((2,2'-(1,2-Ethanediylbis(Nitrilomethylidyne))bis (Phenolato))(2-)-N,N',O,O')-; Cobalt, ((alpha,alpha'-(Ethylenedinitrilo) Di-o-Cresolato)(2-))-; N,N'-Ethylenebis(Salicylideneiminato)Cobalt(II); Salcomin; Salcomine Powder

Chemical Formula: $C_{16}H_{14}CoN_2O_2$

Molecular Weight: 325.25

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse) 0.39 mg/liter (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Cobalt Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

SALCOMINE

SECTION II (continued)

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SALCOMINE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Weast 1979
Sax 1984
Hawley 1981
Hayes 1982
Gosselin 1984
Clayton and Clayton 1981-82
DOT 1984
Merck 1983
Physicians' Desk Reference 1985
Gilman 1985
Verschueren 1983
Farm Chemicals Handbook 1984
Encyc Occupat Health and Safety 1983
Doull 1980
Weiss 1980

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BICYCLO[2.2.1]HEPTANE-2-CARBONITRILE, 5-CHLORO-6-((((METHYLAMINO)CARBONYL)OXY)IMINO)-,(1S-(1 ALPHA, 2 BETA, 4 ALPHA, 5 ALPHA, 6E))-

CAS Registry Number: 15271-41-7

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 865) 2-Norbornanone, endo-3-Chloro-exo-6-Cyano-, O-(Methylcarbamoyl)Oxime; endo-3-Chloro-exo-6-Cyano-2-Norbornanone O-(Methylcarbamoyl)Oxime; 2-exo-Chloro-6-endo-Cyano-2-Norbornanone-O-(Methylcarbamoyl)Oxime; 3-Chloro-6-Cyano-2-Norbornanone-O-(Methylcarbamoyl)Oxime; 3-Chloro-6-Cyanonorbornanone-2 Oxime O,N-Methylcarbamate; 5-Chloro-6-((((Methylamino) Carbonyl)Oxy)Imino)Bicyclo[2.2.1]Heptane-2-Carbonitrile; exo-5-Chloro-6-Oxo-endo-2-Norbornanecarbonitrile O-(Methylcarbamoyl)Oxime; Compound UC-20047 A; ENT 25,962; Tranid; UC 20047; UC 20,047A

Chemical Formula: $C_{10}H_{12}ClN_3O_2$

Molecular Weight: 241.70

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 19 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 318-320°F, 159-160°C (Merck 1983, p. 1369)

Vapor Density (AIR=1): Not Found

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Yes (Sax 1984, p. 692)
Ingestion: Yes (Sax 1984, p. 692)

Health Hazards (Acute, Delayed, and Chronic): High oral and dermal toxicity (Sax 1984, p. 692). Carbamates are cholinesterase inhibitors (Gosselin 1984, p. III-86).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: A carbamate insecticide (Buchel 1983, p. 127). Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: A carbamate insecticide (Buchel 1983, p. 127). Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of chlorine containing compounds and nitrogen oxides (Sax 1984, p. 692).

BICYCLO[2.2.1]HEPTANE-2-CARBONITRILE...

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of chlorine containing compounds and nitrogen oxides (Sax 1984, p. 692).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Acaricide used experimentally for residual control of mobile forms of spider mites, including several phosphate resistant strains. It is neither ovicidal nor systemic and has not been registered (Farm Chemicals Handbook 1984, p. C229).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

A carbamate insecticide (Buchel 1983, p. 127). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms of carbamate poisoning are similar to those of parathion poisoning and may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, dizziness, giddiness, weakness, muscle twitching, difficult breathing, sensation of tightness of chest, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (Gosselin 1984, pp. III-88, 89).

Emergency and First Aid Procedures: An insecticidal carbamate (Buchel 1983, p. 127). Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Hayes 1982
Weast 1979
ACGIH 1983
NIOSH/OSHA 1978
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Clayton and Clayton 1981-82
Arena 1979
Encyc Occupat Health and Safety 1983
Doull 1980
Hawley 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHOMYL

CAS Registry Number: 16752-77-5

Synonyms: Acetimidic Acid, Thio-N-((Methylcarbamoyl)oxy)-, Methyl Ester; 1-(Methylthio)Acetaldehyde O-Methylcarbamoyloxime; 1-(Methylthio) Ethylideneamino Methylcarbamate; 3-Thiabutan-2-one, O-(Methylcarbamoyl)Oxime; Acetimidic Acid, N-((Methylcarbamoyl)Oxy)Thio-, Methyl Ester; Acetimidothioic Acid, Methyl-, N-(Methylcarbamoyl) Ester; Du Pont Insecticide 1179; Du Pont 1179; Ethanimidothioic Acid, N-(((Methylamino)Carbonyl)Oxy)-, Methyl Ester; IN 1179; Insecticide 1,179; Lannate; Mesomile; Methyl N-((((Methylamino)Carbonyl) Oxy)Ethanimido)Thioate; Methyl N-((Methylcarbamoyl)Oxy)Thioacetimidate; Methyl N-[[(Methylamino)Carbonyl] Oxy]Ethanimidothioate; Methyl O-(Methylcarbamoyl) Thiolacetohydroxamate; N-[(Methylcarbamoyl)Oxy]Thioacetimidic Acid Methyl Ester; N-[[(Methylamino) Carbonyl]Oxy]Ethanimidothioic Acid Methyl Ester; Nudrin; S-Methyl N-(Methylcarbamoyloxy)Thioacetimidate; SD 14999; WL 18236

Chemical Formula: $C_5H_{10}N_2O_2S$

Molecular Weight: 162.23

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (mouse) 10 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.2946 at 75°F, 24°C (*Merck 1983)

Vapor Pressure (mmHg): 0.00005 at 77°F, 25°C (*ACGIH 1980)

Melting Point: 172-174°F, 78-79°C (*Merck 1983)

Vapor Density (AIR=1): Not Found

METHOMYL

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 5.8 g/100 ml (Farm Chemicals Handbook 1984, p. C147)

Appearance and Odor: White crystalline solid with slight sulfurous smell (*Farm Chemicals Handbook 1984)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: TWA 2.5 mg/m^3 (*ACGIH 1983)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Jones 1977)
Skin: Yes (*Jones 1977)
Ingestion: Yes (*Jones 1977)

Health Hazards (Acute, Delayed, and Chronic): Methomyl has high oral toxicity, moderate inhalation toxicity and low skin toxicity (Sax 1984, p. 1874). The probable oral lethal dose for humans is between 7 drops and 1 teaspoon for a 150 pound adult. Death is due to respiratory arrest (*Gosselin 1984).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamate Pesticide, Solid) Use agent suitable for type of surrounding fire. Use water in flooding quantities as a fog. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 104).

Special Fire Fighting Procedures: (Non-Specific -- Carbamate Pesticide, Solid) Wear self-contained breathing apparatus (Student 1981, p. 104).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and sulfur oxides (Sax 1984, p. 1874).

NFPA Flammability Rating: Not Found

METHOMYL

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Worthing 1979)

Conditions to Avoid: Do not subject liquid formulations to temperatures below 32°F (*Farm Chemicals Handbook 1984).

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides and sulfur oxides (Sax 1984, p. 1874).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

A nematocide, and an insecticide on vegetables, tobacco, cotton, alfalfa, soy beans, and corn (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide, Solid) Keep unnecessary people away; isolate hazard areas and deny entry. Stay upwind and keep out of low areas. Do not touch spilled material, or handle broken packages without protective equipment. Do not breathe dust, vapors, or the fumes from burning material (Student 1981, p. 104; DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for METHOMYL

(16752-77-5)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White, crystalline solid.

Odor - Slightly sulfurous.

Commercial Forms - Water-soluble liquid or powder.

Use - Insecticide.

Caution: *Flammable. Avoid sources of extreme heat or ignition including sparks or fire. Methomyl will liberate toxic nitrogen and sulfur oxide fumes when heated to decomposition.*

Other Names - Acetimidic acid, thio-N-((methylcarbamoyl)oxy)-, methyl ester; Dupont 1179; Nudrin.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, diazepam, phenytoin, protopam.

Signs and Symptoms of Acute Methomyl Exposure:

Acute exposure to methomyl usually leads to a cholinergic crisis. Signs and symptoms may include increased salivation, lacrimation (tearing), spontaneous defecation, and spontaneous urination. Pinpoint pupils, blurred vision, tremor, muscle twitching, and loss of muscle coordination may occur. Mental confusion, convulsions, and coma may also be noted.

METHOMYL

Gastrointestinal effects include nausea, vomiting, diarrhea, and abdominal pain. Bradycardia (slow heart rate) occurs frequently. Dyspnea (shortness of breath), pulmonary edema, and respiratory arrest may also occur.

Emergency Life-Support Procedures:

Acute exposure to methomyl may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to methomyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to methomyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

METHOMYL

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of methomyl is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of methomyl may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DECABORANE(14)

CAS Registry Number: 17702-41-9

Synonyms: Boron Hydride (B10H14); Decaborane; Decaboron Tetradecahydride

Chemical Formula: $B_{10}H_{14}$

Molecular Weight: 122.22

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.06 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: 415°F, 213°C (*Weast 1979)

Specific Gravity (H_2O=1): 0.95 at 25°C (*Weast 1979)

Vapor Pressure (mmHg): 19 at 100°C (*Sax 1975)

Melting Point: 211°F, 99.5°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble in cold water (*Weast 1979)

Appearance and Odor: White crystals (*Weast 1979) or colorless crystalline needles (*NFPA 1978) with an intense, bitter, chocolate-like odor (*Browning 1969)

DECABORANE(14)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.3 mg/m^3 (0.05 ppm) (NIOSH/OSHA 1978, p. 76).

ACGIH TLV: TWA 0.3 mg/m^3 (0.05 ppm); STEL 0.9 mg/m^3 (0.15 ppm) (skin) (ACGIH 1984, p. 17)

IDLH: 20 ppm (NIOSH/OSHA 1978, p. 76)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (NIOSH/OSHA 1978, p. 77)
Ingestion: Yes (NIOSH/OSHA 1978, p. 77)

Health Hazards (Acute, Delayed, and Chronic): May cause death or permanent injury after very short exposure to small quantities (*Sax 1975). Produces marked irritation of skin and mucous membranes (*Encyc Occupat Health and Safety 1971). May cause liver injury (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 176°F, 80°C (CC) (*NFPA 1978)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Small fires: cover with sand, earth or water spray and keep it wet. Large fires: water spray or fog. Do not scatter spilled material with more water than needed for fire control. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn (DOT 1984, Guide 38).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and full protective clothing (DOT 1984, Guide 38).

Unusual Fire and Explosion Hazards: Decaborane mixed with carbon tetrachloride is dangerously shock sensitive (*Merck 1976). It reacts slowly with air but when mixed with air or oxygen, it becomes highly flammable and may explode. It undergoes an explosive reaction with most oxidizing agents including halogenated hydrocarbons (*Encyc Occupat Health and Safety 1971).

NFPA Flammability Rating: 2

DECABORANE(14)

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Merck 1976)

Conditions to Avoid: Normally stable, but becomes unstable at elevated temperature and pressure (*NFPA 1978).

Incompatibility (Materials to Avoid): Incompatible with ethers; halocarbons; oxygen at 100°C; dimethyl sulfoxide (Sax 1984, p. 856); most oxidizing agents, including halogenated hydrocarbons (*Encyc Occupat Health and Safety 1971). It is corrosive to natural rubber, some synthetic rubbers, some greases, and some lubricants (Weiss 1980, p. 301).

Hazardous Decomposition or Byproducts: It may give off toxic fumes of unburned material (Weiss 1980, p. 301). When heated to decomposition, it emits toxic fumes of boron oxides (Sax 1984, p. 856).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 301)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

In rocket propellants; as catalyst in olefin polymerization (*Merck 1976); rubber vulcanizer (*Browning 1969); to coat metals with corrosion resistant boron; in manufacture of plastics (*Thienes 1972); oxygen scavenger; mothproofing; dye-stripping; reducing and fluxing agent (*Clayton and Clayton 1981-82); stabilizer and rayon delustrant (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Ventilate area of spill. For small quantities, sweep into paper or other suitable material, place in appropriate container and burn in safe place (such as fume hood). Large quantities may be reclaimed. If reclamation is not practical, dissolve in flammable solvent (such as alcohol) and atomize in suitable combustion chamber equipped with appropriate effluent gas cleaning device (*NIOSH/OSHA 1981). Only persons with adequate personal protective equipment should be allowed in vicinity of containers. (*Encyc Occupat Health and Safety 1971). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: cover with water, sand or earth; shovel into metal container and keep material under water. Large spills: dike for later disposal and cover with wet sand or water. Clean up only under supervision of an expert (DOT 1984, Guide 38).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-

DECABORANE(14)

SECTION VIII (continued)

demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DECABORANE

(17702-41-9)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Forms - White crystals or colorless crystalline needles.

Odor - Intense, bitter, chocolatelike.

Commercial Form - 95% pure solid.

Uses - Rocket propellant, catalyst in olefin polymerization, rubber vulcanizer, manufacture of plastics, oxygen scavenger, mothproofing, metal coating, dye-stripping, reducing and fluxing agent, stabilizer and rayon delustrant.

Materials to Avoid - Oxidizers, halogenated hydrocarbons, natural and synthetic rubber, grease, lubricants, acetone.

Caution: *Flammable solid; unstable at elevated temperature. Avoid sources of heat including fire. Decaborane will liberate toxic boron oxide fumes when heated to decomposition.*

Other Names - Boron hydride, decaboron tetradecahydride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital.

DECABORANE

Signs and Symptoms of Acute Decaborane Exposure:

Warning: *Effects may be delayed up to 24 hours. Caution is advised.*

Signs and symptoms of acute exposure to decaborane may include tightness in the chest, dyspnea (shortness of breath), cough, and wheezing. Nausea and pulmonary edema may also occur. Neurological effects of acute exposure include dizziness, headache, weakness, incoordination, muscle spasms, tremor, and seizures. Exposure to decaborane may irritate or burn the skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to decaborane may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to decaborane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to decaborane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

DECABORANE

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas at least twice with large amounts of cool water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of decaborane is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of decaborane may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

DECABORANE

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FORMPARANATE

CAS Registry Number: 17702-57-7

Synonyms: (NIOSH/RTECS Synonyms 1983, Volume 1, p. 834): Carbamic Acid, Methyl-, 4-(((Dimethylamino)Methylene)Amino)-m-Tolyl Ester; ENT 27,305; UC-25074; Union Carbide UC-25074

Chemical Formula: $C_{12}H_{17}N_3O_2$

Molecular Weight: 235.32

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7.2 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

FORMPARANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

FORMPARANATE

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

Buchel 1983
Clayton and Clayton 1981-82
Farm Chemicals Handbook 1984
Hawley 1981
Hayes 1982
Merck 1983
Sax 1984

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIBORANE

CAS Registry Number: 19287-45-7

Synonyms: Boroethane; Boron Hydride; Diborane; Diboron Hexahydride

Chemical Formula: B_2H_6

Molecular Weight: 27.69

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (mouse) 0.033 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Gas

Boiling Point: -135°F, -92.5°C (*Merck 1983)

Specific Gravity (H_2O=1): 0.210 at 15°C (*Merck 1983)

Vapor Pressure (mmHg): 224 at -112°C (*Sax 1979)

Melting Point: -265°F, -165°C (*Merck 1983)

Vapor Density (AIR=1): 1.0 (NFPA 1984, p. 325M-32)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Colorless gas with a repulsive, sickly-sweet odor (*Merck 1983)

DIBORANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: 0.1 mg/m^3 (0.1 ppm) (NIOSH 1987, p. 94)

ACGIH TLV: TWA 0.1 mg/m^3 (0.1 ppm) (ACGIH 1986-87, p. 15)

IDLH: 40 ppm (NIOSH/OSHA 1978, p. 78)

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (*Encyc Occupat Health and Safety 1983)
Skin: Yes (*Encyc Occupat Health and Safety 1983)
Ingestion: Yes (*Encyc Occupat Health and Safety 1983)

Health Hazards (Acute, Delayed, and Chronic): Boranes are highly toxic by inhalation, skin absorption or ingestion. They may produce acute or chronic poisoning (*Encyc Occupat Health and Safety 1983). Diborane is an irritant to the lungs and kidneys (Doull 1980, p. 441). The primary effect of diborane poisoning is lung congestion caused by local tissue irritation produced by the exothermic reaction of hydrolysis (Clayton and Clayton 1981-82, p. 2991).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): -130°F, -90°C (*Hawley 1978)
Flammable Limits:
LEL: 0.8% (*NFPA 1978)
UEL: 88% (*NFPA 1978)

Extinguishing Methods: Inert gas substances such as liquid nitrogen are recommended (*Encyc Occupat Health and Safety 1983).

Special Fire Fighting Procedures: Firefighting should be done from an explosion-resistant location. Use water from unmanned monitors or hose holders to keep fire-exposed containers cool. If it is necessary to stop flow of gas, use water spray to protect personnel effecting shut-off. Personnel should be evacuated immediately. Self-contained breathing apparatus and full protective clothing should be worn (*NFPA 1978). Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 18).

Unusual Fire and Explosion Hazards: It will ignite spontaneously in moist air at room temperature. Also, it reacts violently with vaporizing liquid-type extinguishing agents (NFPA 1984, p. 49-36).

NFPA Flammability Rating: 4

DIBORANE

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (NFPA 1984, p. 49-36).
Stable:

Conditions to Avoid: Avoid moist air, electrical sparks, open flames or any other heat source (NFPA 1984, p. 49-36).

Incompatibility (Materials to Avoid): Incompatible with air, halogenated compounds, aluminum, lithium, active metals, oxidized surfaces (NIOSH/OSHA 1978, p. 78), chlorine, fuming nitric acid, nitrogen trifluoride, oxygen, and phosphorus trifluoride (*NFPA 1978).

Hazardous Decomposition or Byproducts: It hydrolyzes in water to hydrogen and boric acid (*Merck 1983).

Hazardous Polymerization: **May Occur:** Yes (*Thienes 1972)
May Not Occur:

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

It is an intermediate for trialkyl and triaryl boranes (polymerization catalyst); copolymerization catalyst for styrene and butadiene; polymerization catalyst for olefins and epoxides. It is also used in the production of hard boron coatings on metals and ceramics; rocket propellants; as a rubber vulcanizer; reducing agent; flame-speed accelerator and a doping gas (*SRI, *Merck 1983).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind. Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if possible. Use water spray to reduce vapors. Evacuate area endangered by gas. Isolate for 1/2 mile in all directions if tank car or truck is involved in fire (DOT 1984, Guide 18).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for DIBORANE

(19287-45-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless gas.

Odor - Repulsive, sickly sweet.

Commercial Form - 95 to 99% pure compressed gas in steel cylinders.

Uses - Chemical intermediate, catalyst, reducing agent, rubber vulcanizer, doping agent, rocket propellant, flame speed accelerator.

Materials to Avoid - Oxidizers, aluminum, halogenated compounds, water (except for emergency life support).

Caution: *Explosion potential is high. Avoid sources of extreme heat or ignition including sparks or fire.*

Other Names Boroethane, boron hydride, diboron hexahydride.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Diborane Exposure:

Warning: *Effects may be delayed up to 24 hours. Caution is advised.*

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Signs and symptoms of acute exposure to diborane may include tightness in the chest, dyspnea (shortness of breath), cough, and wheezing. Nausea and pulmonary edema may also occur.

Other possible effects of acute exposure include dizziness, headache, weakness, lack of coordination, muscle spasms, tremor, and seizures. Exposure to diborane may irritate or burn the skin, eyes, and mucous membranes.

Emergency Life-Support Procedures:

Acute exposure to diborane may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to diborane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to diborane.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

DIBORANE

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas at least twice with large amounts of cool water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PENTABORANE

CAS Registry Number: 19624-22-7

Synonyms: Pentaborane (9); Pentaboron Nonahydride; (9)-Pentaboron Nonahydride

Chemical Formula: B_5H_9

Molecular Weight: 63.17

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.018 mg/liter 4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 140°F, 60°C (*Merck 1976)

Specific Gravity (H_2O=1): 0.61 at 0°C/4°C (Merck 1983, p. 1020)

Vapor Pressure (mmHg): 171 at 20°C (NIOSH 1985, p. 184)

Melting Point: -51.9°F, -46.6°C (Merck 1983, p. 1020)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Colorless liquid with a strong, pungent, foul, sour milkish odor (*CHRIS 1978).

PENTABORANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: TWA 0.01 mg/m^3 (0.005 ppm) (NIOSH/OSHA 1978, p. 148)

ACGIH TLV: TWA 0.01 mg/m^3 (0.005 ppm); STEL 0.03 mg/m^3 (0.015 ppm) (*ACGIH 1980)

IDLH: 3 ppm (NIOSH/OSHA 1978, p. 148)

Other Limits Recommended: Short-term inhalation limits: 25 ppm for 5 minutes, 8 ppm for 15 minutes, 4 ppm for 30 minutes; 2 ppm for 60 minutes (Weiss 1980, p. 731).

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 2124)
Skin: Not Found
Ingestion: No (Weiss 1980, p. 731)

Health Hazards (Acute, Delayed, and Chronic): May cause death or permanent injury after very short exposure to small quantities (Sax 1984, p. 2124).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 86°F, 30°C (CC) (Hawley 1981, p. 782)
Flammable Limits:
LEL: 0.42% (NIOSH/OSHA 1978, p. 148)
UEL: 98% (Weiss 1980, p. 731)

Extinguishing Methods: If material is on fire or involved in fire, do not extinguish unless flow can be stopped. Do not use water. Extinguish small fires with dry chemical or carbon dioxide (Student 1981, p. 394). For large fires withdraw and let burn (DOT 1984, Guide 75).

Special Fire Fighting Procedures: Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Wear positive pressure breathing apparatus and full protective clothing (DOT 1984, Guide 75).

Evacuation: if fire becomes uncontrollable or container is exposed to direct flame -- evacuate for a radius of 1,500 feet. If material is leaking (not on fire), downwind evacuation must be considered (Student 1981, p. 394).

Unusual Fire and Explosion Hazards: Ignites spontaneously in air (Weiss 1980, p. 731). Reacts violently with halogenated extinguishing agents (*NFPA 1978). Boron hydrides present considerable fire and explosion hazard. They undergo explosive reaction with most oxidizing agents, including halogenated hydrocarbons (*Encyc Occupat Health and Safety 1971). Fires tend to reignite (Weiss 1980, p. 731).

PENTABORANE

SECTION IV (continued)

NFPA Flammability Rating: 3

SECTION V -- REACTIVITY DATA

Stability: Unstable: Yes (Merck 1983, p. 1020)
Stable:

Conditions to Avoid: Direct sunlight and sources of ignition (*Encyc Occupat Health and Safety 1983); decomposes very slowly at 150C (Merck 1983, p. 1020).

Incompatibility (Materials to Avoid): Dimethyl sulfoxide (Sax 1984, p. 2124), water, most oxidizing agents (including halogenated hydrocarbons) (*Encyc Occupat Health and Safety 1971 and see Section IV).

Hazardous Decomposition or Byproducts: On decomposition, it emits toxic fumes and can react vigorously with oxidizing materials (Sax 1984, p. 2124).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 731)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Fuel for air-breathing engines; propellant (*Hawley 1977).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material, stop leak if you can do it without risk. For spills dike for later disposal and do not apply water unless directed to do so. Clean up only under supervision of an expert. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them (DOT 1984, Guide 75). Avoid breathing vapors, and keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 394).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PENTABORANE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Death can occur by central nervous system poisoning. Inhalation of low concentrations causes behavioral changes, loss of recent memory, poor judgment, nausea, vomiting, drowsiness, and difficulty in focusing. Upon inhalation of higher concentrations, headache, dizziness, nervous excitation, muscular pain, uncoordination, cramps, tremors, convulsions, and coma may occur (*Grant 1974; *Thienes 1972; *Encyc Occupat Health and Safety 1983; *Casarett 1975; *ACGIH 1980).

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 75).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- DIGOXIN

CAS Registry Number: 20830-75-5

Synonyms: Acygoxin; Card-20(22)-enolide, 3-((O-2,6-dideoxy-beta-D-ribo-hexopyranosyl-(hexopyranosyl-(1-4)-2,6-dideoxy-beta-D-ribo-hexopyranosyl)oxy)-12,14-dihydroxy-,; Chloroformic digitalin; Lanacordin; Lanatilin; Lanicor; Lanoxin; Rougoxin; Saroxin; Vanoxin; Cordioxil; Davoxin; Digacin; Digitalis Glycoside; Dilanacin; Dixina; Homolle's Digitalin

Chemical Formula: $C_{41}H_{64}O_{14}$

Molecular Weight: 780.92

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 0.2 mg/kg (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Decomposition range 446-509°F, 230-265°C (Merck 1983, p. 460)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (*Sunshine 1969)

DIGOXIN

SECTION II (continued)

Appearance and Odor: Clear to white crystals or white crystalline powder. Odorless (*Osol 1975).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (*Gosselin 1976)

Health Hazards (Acute, Delayed, and Chronic): Material is a digitalis glycoside. Ingestion can cause death. Material is considered super toxic; probable human oral lethal dose is less than 5 mg/kg, a taste (less than 7 drops) for a 70 kg (150 lb.) person (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Persons at risk include those taking drugs for thyroid and renal diseases (*Osol 1975, *AHFS 1984). Quinidine and diuretics taken concurrently with digoxin can be hazardous (Gilman 1985, p. 743). It should be used with extreme care during pregnancy and in nursing mothers (*AHFS 1984).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Medicines, Solid, Poison B)
Extinguish fire using agent suitable for type of surrounding fire; material burns with difficulty. Use water in flooding quantities as fog.
Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 322).

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

DIGOXIN

SECTION V (continued)

Conditions to Avoid: Avoid light (*AHFS 1984)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Material is a cardiotonic drug (*Goodman 1975).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Medicines, Solid, Poison B) Avoid breathing dusts, and fumes from burning materials. Keep upwind. Avoid bodily contact with the material. Wash away any material which may have contacted the body with copious amounts of water or soap and water (Student 1981, p. 322).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Data here refer specifically to digitalis. Nausea and vomiting, headache, fatigue, weakness, drowsiness, and abdominal discomfort are symptomatic of toxicity. Visual disturbances (including blurring, halos, and aberrations of color), emotional disorders (including confusion, disorientation, aphasia, delirium, and hallucinations) and convulsions (*Gosselin 1976).

Emergency and First Aid Procedures: Not Found

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ALUMINUM PHOSPHIDE

CAS Registry Number: 20859-73-8

Synonyms: AIP; Al-Phos; Aluminum Phosphide (AP); Aluminum Monophosphide; Celphos; Delicia; Delicia Gastoxin; Detia; Detia Gas EX-B; Detia-EX-B; Phostoxin; Phostoxin-A; Quickphos

Chemical Formula: AlP

Molecular Weight: 57.95

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (human) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 2.85 at 15°C/4°C (*Merck 1976)

Vapor Pressure (mmHg): Not Found

Melting Point: Does not melt or decompose at temperatures up to 1000°C (*Merck 1976)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found (also see Section V)

Appearance and Odor: Aluminum phosphide exists as dark gray or dark yellow crystals (*Merck 1976)

ALUMINUM PHOSPHIDE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 178)
Skin: Not Found
Ingestion: Yes (Gosselin 1984, p. II-120)

Health Hazards (Acute, Delayed, and Chronic): Acute toxicity occurs primarily by the inhalation route when aluminum phosphide decomposes into the toxic gas, phosphine (*Rumack 1975 to Present). The human median lethal dose for aluminum phosphide has been reported to be 20 mg/kg (*NIOSH/RTECS 1985). Rated as super toxic: probable oral lethal dose is less than 5 mg/kg or less than 7 drops for a 70 kg (150 lb.) person (Gosselin 1984, pp. II-119-120).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Do not use water or foam. Small fires can be extinguished with dry chemical, soda ash, or lime. Large fires -- withdraw from area and let fire burn. Move container from fire only if you can do it without risk (DOT 1984, Guide 41).

Special Fire Fighting Procedures: Wear self-contained breathing apparatus when fighting fires involving this material. If contact with the material is anticipated, wear full protective clothing (Student 1981, p. 21).

Unusual Fire and Explosion Hazards: Releases toxic fumes on exposure to moist air, water, or acids (*Merck 1976, *Peer Review Committee; *Bretherick 1975).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Stable when dry (*Worthing 1979)

Conditions to Avoid: Moist air (*Merck 1976)

ALUMINUM PHOSPHIDE

SECTION V (continued)

Incompatibility (Materials to Avoid): Water (*Peer Review Committee), dilute mineral acids, dilute or concentrated hydrochloric acid (*Bretherick 1979).

Hazardous Decomposition or Byproducts: Phosphine gas (*Peer Review Committee; *Bretherick 1979).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Insecticidal fumigant for grain, peanuts, processed food, animal feed, leaf tobacco, cottonseed, and as space fumigant for flour mills, warehouses, and railcars (Farm Chemicals Handbook 1984, p. C12); used in semiconductor research (*Merck 1976).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Shut off ignition; no flares, smoking, or flames in hazard area. Do not touch spilled material. Do not get water on spilled material or inside container. Dike spill for later disposal. Shovel small spill into clean, dry container, and cover. Move containers from spill area. Avoid breathing dusts (Student 1981, p. 21). Cover large powder spill with plastic sheet or tarp to minimize spreading. Clean up only under supervision of an expert (DOT 1984, Guide 41).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

ALUMINUM PHOSPHIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for ALUMINUM PHOSPHIDE

(20859-73-8)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Dark gray or dark yellow crystals.

Commercial Forms - Tablets or pellets.

Uses - Fumigant, pesticide, semiconductor research.

Materials to Avoid - Acids, water (except for use in emergency life support).

Caution: *Flammable. Avoid sources of heat or ignition including sparks or fire. Toxic phosphine gas will be released upon contact with moisture. Aluminum phosphide may spontaneously ignite in air.*

Other Names - Al-Phos, Celphide, Celphine, Celphos, Delicia, Detia, Phostoxin, Quickphos.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, normal saline, D5W, Ringer's lactate, diazepam, phenytoin.

Signs and Symptoms of Acute Aluminum Phosphide Exposure:

Warning: *Effects may be delayed for several hours. Caution is advised.*

Acute exposure to aluminum phosphide usually results in headache, cough, tightness and pain in the chest, shortness of breath, dizziness, lethargy, and stupor. Muscle pain, fatigue, chills, tremor, lack of coordination, seizures, and coma may be observed. Pulmonary edema and cardiac irregularities are also commonly found.

ALUMINUM PHOSPHIDE

Gastrointestinal effects include nausea, vomiting, abdominal pain, and diarrhea. Renal (kidney) damage, hepatic (liver) damage, and jaundice may also occur. Contact with aluminum phosphide may cause severe burns to skin and eyes.

Emergency Life-Support Procedures:

Acute exposure to aluminum phosphide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to aluminum phosphide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to aluminum phosphide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

ALUMINUM PHOSPHIDE

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

Ingestion Exposure: No information is available.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FOSTHIETAN

CAS Registry Number: 21548-32-3

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, page 510) Imidocarbonic Acid, Phosphonodithio-, Cyclic Methylene P,P-Diethyl Ester; AC 64475; Acconem; CL 64475; (Diethoxyphosphinylimino)-1,3-Dithietane; Geofos; Nem-a-tak; Phosphoramidic Acid, 1,3 Dithietan-2-ylidene-, Diethyl Ester; 1,3-Dithietan-2-ylidenephosphoramidic Acid Diethyl Ester; Phosphonodithioimidocarbonic Acid Cyclic Methylene P,P-Diethylester (Merck 1983 Synonyms, p. 607) 2-(Diethoxyphosphinylimino)-1,3-Dithietane

Chemical Formula: $C_6H_{12}NO_3PS_2$

Molecular Weight: 241.28

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 4.7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.3 at 25°C (Merck 1983, p. 607)

Vapor Pressure (mmHg): 0.0000065 at 25°C (Merck 1983, p. 607)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

FOSTHIETAN

SECTION II (continued)

Solubility in Water: 50 g/kg at 25°C (Merck 1983, p. 607)

Appearance and Odor: Pale yellow liquid, mercaptan-like odor (Merck 1983, p. 607)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organic Phosphorus Insecticides) (Hayes 1982, p. 301)
Skin: Yes (Sax 1984, p. 980)
Ingestion: Yes (Sax 1984, p. 980)

Health Hazards (Acute, Delayed, and Chronic): This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 86) Organic phosphorus insecticides are absorbed by the skin, as well as by the respiratory and gastrointestinal tracts (Hayes 1982, p. 301).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 86) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 86) Stay upwind; keep out of low areas. Move containers from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of nitrogen oxides, phosphorus oxides and sulfur

FOSTHIETAN

SECTION IV (continued)

oxides (Sax 1984, p. 980). This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 86) Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides, phosphorus oxides and sulfur oxides (Sax 1984, p. 980).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a nematocide and insecticide (Merck 1983, p. 607). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 86) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

FOSTHIETAN

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: This compound is a liquid organophosphorus insecticide (Buchel 1983, p. 86) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 19 8
Hawley 1981
Weast 1979
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- LEPTOPHOS

CAS Registry Number: 21609-90-5

Synonyms: Phosphonothioic Acid, Phenyl-, O-(4-Bromo-2,5-Dichlorophenyl) O-Methyl Ester; Abar (Velsicol); Fosvel; K62-105; Lepton; MBCP; NK 711; O-(2,5-Dichloro-4-Bromophenyl) O-Methyl Phenylthiophosphonate; O-(2,5-Dichloro-4-Bromophenyl) O-Methyl Phenyl Thiophosphonate; O-(4-Bromo-2,5-Dichlorophenyl) O-Methyl Phenylphosphonothioate; O-(4-Bromo-2,5-Dichlorophenyl) O-Methylphenylphosphonothioate; O-4-Bromo-2,5-Dichlorophenyl-O-Methyl Phenylphosphonothioate; Oleophosvel; V.C.S.; VCS 5-D; VDS-506; Velsicol 506; Velsicol VCS 506; VVS-506

Chemical Formula: $C_{13}H_{10}BrCl_2O_2PS$

Molecular Weight: 412.07

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 30 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.53 at 25°C (*Worthing 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: 158-159°F, 70.2-70.6°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

LEPTOPHOS

SECTION II (continued)

Solubility in Water: 2.4 mg/liter (*Worthing 1979)

Appearance and Odor: White crystalline (*Spencer 1982) or colorless amorphous solid (*Worthing 1979); the technical product is a light tan powder (*Spencer 1982).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide, n.o.s.) (DOT 1984, Guide 55)
Skin: Yes (*Sax 1979)
Ingestion: Yes (*Sax 1979)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic; it is capable of causing death or permanent injury by exposure during normal use (*Sax 1979).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Container may explode in heat of fire. Fire may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

LEPTOPHOS

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (*Spencer 1982)

Conditions to Avoid: Strong alkalies (*Worthing 1979)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Decomposes above 356°F, 180°C (*Spencer 1982).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as an insecticide; its use is not permitted in the U.S. (*SRI). Denied registration as a pesticide in the U.S. (USEPA/ Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do it without risk. Use water spray to reduce vapors. Small dry spills: with clean shovel place material into clean, dry container and cover; move containers from spill area (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

LEPTOPHOS

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, weakness, muscle twitching, difficult breathing, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (*Gosselin 1976).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- MERCURIC OXIDE

CAS Registry Number: 21908-53-2

Synonyms: Mercury(II) Oxide; CI 77760; Hydrargyrum Oxid Flav; Mercuric Oxide, Red; Mercuric Oxide, Solid (DOT); Mercuric Oxide, Yellow; Mercuric Oxides, Red and Yellow; Mercury Monoxide; Mercury Oxide (HgO); Mercury(2+) Oxide; Natural Montroydite; Red Oxide of Mercury; Red Precipitate; Santar; Santar M; Yellow Mercuric Oxide; Yellow Oxide of Mercury; Yellow Precipitate

Chemical Formula: HgO

Molecular Weight: 216.61

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 18 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Mercury Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 11.1 at 39°F, 4°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: Decomposes at 932°F, 500°C (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.053 grams/liter at 77°F, 25°C; 0.395 grams/liter at 212°F, 100°C (*Weast 1979)

MERCURIC OXIDE

SECTION II (continued)

Appearance and Odor: Red or orange-red heavy crystalline powder or scales, yellow when finely powdered; odorless (*Merck 1976)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: (Mercury and inorganic compounds) Ceiling: 0.1 mg/m^3 (NIOSH 1987, p. 152)

ACGIH TLV: (Mercury, aryl and inorganic compounds) TWA 0.1 mg/m^3 (ACGIH 1986-87, p. 22)

IDLH: Not Found

Other Limits Recommended: NIOSH: 0.05 mg/m^3, 10-hour TWA, as mercury (NIOSH 1987, p. 152) IDLH: (Mercury and inorganic compounds) 28 mg/m^3, as mercury (NIOSH 1987, p. 152)

Routes of Entry: **Inhalation:** Yes (*Sax 1975)
Skin: Yes (*Sax 1975)
Ingestion: Yes (*Sax 1975)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by ingestion, inhalation, or skin absorption. Very short exposure to small quantities may cause death or permanent injury (*Sax 1975). Following ingestion, mercuric oxide is readily converted to mercuric chloride, the most dangerous mercury compound. Mercuric oxide dust has a corrosive effect on eyes, skin, and respiratory tract (*Rumack 1975 to Present).

Medical Conditions Generally Aggravated by Exposure: People with a history of allergies or known sensitization to mercury, chronic respiratory disease, nervous system disorders, or kidney disorders are at increased risk from exposure (*NIOSH/OSHA 1981).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Not Flammable (Weiss 1980, p. 585)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 53).

Special Fire Fighting Procedures: Wear full body protective clothing and self-contained breathing apparatus (*Rumack 1975 to Present).

Unusual Fire and Explosion Hazards: When heated to decomposition (932°F, 500°C) it decomposes into mercury and oxygen. Fumes from fire may contain

MERCURIC OXIDE

SECTION IV (continued)

poisonous mercury vapor; oxygen may increase intensity of fire (*CHRIS 1978). Explosion of mercuric oxide may occur with friction or application of heat (*Rumack 1975 to Present).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Weiss 1980, p. 585)

Conditions to Avoid: Light; may decompose into mercury and oxygen (*Merck 1976).

Incompatibility (Materials to Avoid): Reducing agents (*Merck 1976).

Hazardous Decomposition or Byproducts: Decomposes into mercury and oxygen at 932°F, 500°C (*CHRIS 1978).

Hazardous Polymerization: May Occur:
May Not Occur: Yes (Weiss 1980, p. 585)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Chemical intermediate for mercury salts, organic mercury compounds, and chlorine monoxide; antiseptic in pharmaceuticals; component of dry cell batteries; pigment and glass modifier; fungicide; preservative in cosmetics; analytical reagent; formerly used in antifouling paints (*SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Isolate hazard area. Stay upwind; keep out of low areas. Do not touch spilled material. Take up small spills with sand or other non-combustible absorbent material and place into containers for later disposal. For small, dry spills, use clean shovel to place material into clean dry containers. Dike far ahead of large spills for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

MERCURIC OXIDE

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl	GOOD/LIMITED**
Neoprene	GOOD/LIMITED**
Nitrile	GOOD/LIMITED**
PVC	GOOD/LIMITED**
Viton/Neoprene	POOR/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for MERCURIC OXIDE

(21908-53-2)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Red or orange-red heavy crystalline powder, yellow when finely powdered.

Odor - None.

Commercial Form - Solid in 100-lb drums.

Uses - Chemical intermediate, analytical reagent, pigment and glass modifier, polishing compound, paint antifouler, antiseptic, fungicide, dry cell batteries, cosmetics.

Materials to Avoid - Reducing agents, inorganic acids, water (except for use in emergency life support).

Caution: *Extreme temperatures (in excess of 500 degrees C) may decompose mercuric oxide into mercury and oxygen. Avoid sources of extreme heat.*

Other Names - Red mercuric oxide, yellow mercury oxide, Natural Monotroydite, Santar.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, milk, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, diazepam, phenytoin, phenobarbital, penicillamine, dimercaprol.

MERCURIC OXIDE

Signs and Symptoms of Acute Mercuric Oxide Exposure:

Signs and symptoms of acute exposure to mercuric oxide may be severe and include increased salivation, foul breath, inflammation and ulceration of the mucous membranes, abdominal pain, and bloody diarrhea. Oliguria (scanty urination), anuria (suppression of urine formation), and acute renal failure may be noted. Weak pulse, seizures, psychic disturbances, circulatory collapse, chest pain, and dyspnea (shortness of breath) may be observed. Dermal exposure may result in dermatitis (red, inflamed skin).

Emergency Life-Support Procedures:

Acute exposure to mercuric oxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to mercuric oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to mercuric oxide.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

MERCURIC OXIDE

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas for 15 minutes with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLORTHIOPHOS

CAS Registry Number: 21923-23-9

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 150) Phosphorothioic Acid, O,O-Diethyl O-((2,5-Dichloro-4-Methylthio)Phenyl) Ester; Celamerck S-2957; Celathion; CM S 2957; O-(Dichloro(Methylthio)Phenyl) O,O-Diethyl Phosphorothioate (3 isomers); O,O-Diethyl-O-2,4,5-Dichloro- (Methylthio)Phenyl Thionophosphate; ENT 27635; OMS 1342; S 2957

Chemical Formula: $C_{11}H_{15}Cl_2O_3PS_2$

Molecular Weight: 361.25

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rabbit) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 307-316°F, 153-158°C at 0.013 mmHg (Worthing 1983, p. 130)

Specific Gravity (H_2O=1): 1.345 at 20°C (Worthing 1983, p. 130)

Vapor Pressure (mmHg): 0.0004 at 25°C (Worthing 1983, p. 130)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 0.3 mg/liter (Worthing 1983, p. 130)

CHLORTHIOPHOS

SECTION II (continued)

Appearance and Odor: Yellow-brown liquid which tends to crystallize at less than 25°C (Worthing 1983, p. 130)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)

Health Hazards (Acute, Delayed, and Chronic): Classified as extremely hazardous by the World Health Organization (Encyc Occupat Health and Safety 1983, p. 1619) (Non-Specific -- Organophosphorus Pesticide) Organic phosphorus insecticides are absorbed by the skin, as well as by the respiratory and gastrointestinal tracts. They are cholinesterase inhibitors (Hayes 1982, p. 301).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Move containers from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Container may explode in heat of fire (DOT 1984, Guide 55).

CHLORTHIOPHOS

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Product discontinued by Celamerck. It is used as an insecticide and acaricide (Farm Chemicals Handbook 1984, p. C55).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

**Based on a chemical analog.

CHLORTHIOPHOS

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Organophosphorus Pesticide) Symptoms are headache, giddiness, blurred vision, nervousness, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Signs include sweating, tearing, salivation, vomiting, cyanosis, convulsions, coma, loss of reflexes and loss of sphincter control (Hayes 1982, p. 302).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched but no information found:

Weast 1979
Hawley 1981
Clayton and Clayton 1981-82
Doull 1980
Buchel 1983
Merck 1983
Student 1981
NFPA 1984
Gosselin 1984
Verschueren 1983
Weiss 1980
ACGIH 1984
NIOSH/OSHA 1978

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FENAMIPHOS

CAS Registry Number: 22224-92-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 126) Phosphoramidic Acid, Isopropyl-, 4-(Methylthio)-m-Tolyl Ethyl Ester; BAY 68138; ENT 27572; Ethyl 3-Methyl-4-(Methylthio)Phenyl (1-Methylethyl)Phosphoramidate; Ethyl 4-(Methylthio)-m-Tolyl Isopropylphosphoramidate; Isopropylamino-O-Ethyl-(4-Methylmercapto-3-Methylphenyl) Phosphate; 1-(Methylethyl)-Ethyl 3-Methyl-4-(Methylthio)Phenyl Phosphoramidate; Nemacur; Nemacur P; Phenamiphos; Phosphoramidic Acid, (1-Methylethyl)-, Ethyl (3-Methyl-4-(Methylthio)Phenyl) Ester

Chemical Formula: $C_{13}H_{22}NO_3PS$

Molecular Weight: 303.39

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.091 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 10/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.0000000098 at 86°F, 30°C (Farm Chemicals Handbook 1984, p. C161)

Melting Point: 121°F, 49.2°C (Farm Chemicals Handbook 1984, p. C161)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

FENAMIPHOS

SECTION II (continued)

Solubility in Water: 400 mg/liter (Farm Chemicals Handbook 1984, p. C161); 700 mg/liter at 20°C (Worthing 1983)

Appearance and Odor: Brown, waxy solid (Farm Chemicals Handbook 1984, p. C161); colorless solid (Worthing 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: 0.1 mg/m^3 (skin) (ACGIH 1986-87, p. 19)

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1376)
Skin: Yes (Sax 1984, p. 1376)
Ingestion: Yes (Sax 1984, p. 1376)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic orally, by inhalation, and by absorption through the skin (Sax 1984, p. 1376). (Non-Specific -- Parathion) Death may occur from respiratory failure (Gosselin 1984, p. III-340).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, n.o.s.) Container may explode in heat of fire. Fire and runoff from fire control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

FENAMIPHOS

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Farm Chemicals Handbook 1984, p. C161)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Emits toxic fumes of nitrogen oxides, phosphorus oxides, and sulfur oxides when heated to decomposition (Sax 1984, p. 1376).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is used as a nematocide (Farm Chemicals Handbook 1984, p. C161).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. Take up small, dry spills with clean shovel and place in clean, dry container. Dike far ahead of large spills for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

FENAMIPHOS

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for FENAMIPHOS

(22224-92-6)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Colorless solid.

Commercial Form - Brown, waxy solid.

Use - Pesticide.

Caution: *Explosion potential is high; containers may explode in heat of fire. Avoid sources of extreme heat.*

Other Names - Bay 68138, ENT 27572, ethyl 3-methyl-4-(methylthio)phenyl (1-methylethyl)phosphoramidate, Nemacur.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, pralidoxime, diazepam, phenytoin, phenobarbital.

Signs and Symptoms of Acute Fenamiphos Exposure:

Note: Fenamiphos is a cholinesterase inhibitor.

Acute exposure to fenamiphos may produce the following signs and symptoms: pinpoint pupils, blurred vision, headache, dizziness, muscle spasms, and profound weakness. Vomiting, diarrhea, abdominal pain, seizures, and coma may also occur. The heart rate may increase following oral exposure or decrease following dermal exposure. Hypotension (low blood pressure) may occur although hypertension (high blood pressure) is not uncommon. Chest pain may be noted. Respiratory symptoms include dyspnea (shortness of breath), respiratory depression, and respiratory paralysis. Psychosis may occur.

FENAMIPHOS

Emergency Life-Support Procedures:

Acute exposure to fenamiphos may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to fenamiphos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to fenamiphos.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

FENAMIPHOS

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of fenamiphos is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of fenamiphos may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- OXAMYL

CAS Registry Number: 23135-22-0

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 910): Oxamimidic Acid, N',N'-Dimethyl-N-((Methylcarbamoyl)oxy)-1(Methylthio); D-1410; 2-Dimethylamino-1-(Methylthio)Glyoxal O-Methylcarbamoylmonoxime; DPX 1410; Insecticide-Nematicide 1410; Thioxamyl; Vydate; Methyl 2-(Dimethylamino)-N-(((Methylamino)Carbonyl)Oxy)-2-Oxoethanimidothioate; S-Methyl 1-(Dimethylcarbamoyl)-N-(Methylcarbamoyl)Oxy)Thioformimidate; Methyl N',N'-Dimethyl-N-((Methylcarbamoyl)Oxy)-1-Thiooxamimidate; Vydate L Oxamyl Insecticide/Nematocide (Hayes 1982 Synonyms, p. 457)
N,N-Dimethyl-alpha-Methylcarbamoyloxyimino-alpha-(Methylthio)acetamide

Chemical Formula: $C_7H_{13}N_3O_3S$

Molecular Weight: 219.29

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat\ 0.17 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.00023 at 25°C (Hayes 1982, p. 457)

Melting Point: 212-216°F, 100-102°C; changes to form melting at 226-230°F, 108-110°C (Hayes 1982, p. 457)

OXAMYL

SECTION II (continued)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Solubility 28 g/100 g at 25°C (Farm Chemicals Handbook 1984, p. C170)

Appearance and Odor: White, crystalline solid (Farm Chemicals Handbook 1984, p. C170) with slight sulfurous odor (Hayes 1982, p. 457).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1174)
Skin: Yes (Gosselin 1984, p. II-308)
Ingestion: Yes (Hayes 1982, p. 458)

Health Hazards (Acute, Delayed, and Chronic): Classified by the World Health Organization as highly hazardous (Encyc Occupat Health and Safety 1983, p. 1622). Has also been rated as extremely to super-toxic (Gosselin 1984, p. II-308). Acute oral exposure (ingestion) to oxamyl has caused death (Hayes 1982, p. 458). Oxamyl is a potent cholinesterase inhibitor (Gosselin 1984, p. II-308).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This is a solid carbamate pesticide (Hayes 1982, p. 457). Extinguish fire using agent suitable for type of surrounding fire, as the material itself does not burn or burns with difficulty. Use water in flooding quantities as a fog. Use alcohol foam, carbon dioxide or dry chemical (Student 1981, p. 104).

Special Fire Fighting Procedures: This is a solid carbamate pesticide (Hayes 1982, p. 457). Move container from fire area. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

OXAMYL

SECTION IV (continued)

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits toxic fumes of nitrogen oxides and sulfur oxides (Sax 1984, p. 1174). This is a solid carbamate pesticide (Hayes 1982, p. 457). Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (Hayes 1982, p. 457)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, hazardous fumes of nitrogen oxides and sulfur oxides may be emitted (Sax 1984, p. 1174).

Hazardous Polymerization: **May Occur** Not Found:
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Used as an insecticide, nematicide and acaricide on many field crops, vegetables, fruits, and ornamentals (Farm Chemicals Handbook 1984, p. C170).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This is a solid carbamate pesticide (Hayes 1982, p. 457). Keep unnecessary people away; isolate hazard areas and deny entry. Stay upwind, keep out of low areas. Do not touch spilled material, or breathe the vapors, dusts or fumes from burning materials. Do not handle broken packages without protective equipment. Wash away any material that may have contacted the body with soap and water (Student 1981, p. 104; DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

OXAMYL

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for OXAMYL

(23135-22-0)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - White, crystalline solid.

Odor - Slightly sulfurous.

Commercial Forms - Water-soluble liquid or granules.

Use - Pesticide.

Other Names - Oxamil, Thioxamyl, Vydate, 2-dimethylamino-1-(methylthio)glyoxal O-methylcarbamoylmonoxime.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, atropine, diazepam, phenytoin, protopam.

Signs and Symptoms of Acute Oxamyl Exposure:

Acute exposure to oxamyl usually leads to a cholinergic crisis. Signs and symptoms may include increased salivation, lacrimation (tearing), perspiration, spontaneous defecation, and spontaneous urination. Pinpoint pupils, blurred vision, tremor, muscle twitching, mental confusion, convulsions, and coma may occur. Gastrointestinal symptoms include abdominal pain, diarrhea, nausea, and vomiting. Bradycardia (slow heart rate) is common. Dyspnea (shortness of breath) and pulmonary edema may also occur.

OXAMYL

Emergency Life-Support Procedures:

Acute exposure to oxamyl may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to oxamyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. Transport to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to oxamyl.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas three times with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. Transport to a health care facility.

OXAMYL

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of oxamyl is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Ingestion of oxamyl may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. Transport to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- FORMETANATE HYDROCHLORIDE

CAS Registry Number: 23422-53-9

Synonyms: Formetanate; Carbamic Acid, Methyl-, Ester with N'-(m-Hydroxyphenyl)-N,N-Dimethylformamidine, Monohydrochloride; Carzol; Carzol SP; ENT 27566; EP 332; Formetanate Monohydrochloride; m-(((Dimethylamino)Methylene)Amino)Phenyl Methylcarbamate Hydrochloride; Methanimidamide, N,N-Dimethyl-N'-(3-(((Methylamino)Carbonyl)Oxy)Phenyl)-, Monohydrochloride; N,N-Dimethyl-N'-(3-(((Methylamino)Carbonyl)Oxy)Phenyl) methanimidamide; Schering 36056; SN 36056

Chemical Formula: $C_{11}H_{15}N_3O_2 \cdot ClH$

Molecular Weight: 257.8

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.16 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 500/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.00000002 (Worthing 1983)

Melting Point: 392-396°F, 200-202°C (decomposes) (Farm Chemicals Handbook 1983, p. C46)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

FORMETANATE HYDROCHLORIDE

SECTION II (continued)

Solubility in Water: Greater than 50% (*Spencer 1973)

Appearance and Odor: White powder with a faint odor (*Martin and Worthing 1974)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Carbamate) (Doull 1980, p. 375)
Skin: No (Gosselin 1984, p. II-306)
Ingestion: Yes (Non-Specific -- Carbamate) (Doull 1980, p. 375)

Health Hazards (Acute, Delayed, and Chronic): Extremely toxic to humans. Not absorbed through contact with skin. Inhalation or ingestion may cause poisoning. Inhibits cholinesterase activity so effects are in relation to action on nervous system and can result in death (*Rumack 1975 to Present; Gosselin 1984, p. II-306).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamates Pesticide, Solid, n.o.s.) Extinguish fire using agent suitable for type of surrounding fire, as the material itself does not burn or burns with difficulty. Use water in flooding quantities as a fog. Use alcohol foam, carbon dioxide, or dry chemical (Student 1981, p. 104).

Special Fire Fighting Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Wear self-contained breathing apparatus when fighting fire involving this material (Student 1981, p. 104). Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

FORMETANATE HYDROCHLORIDE

SECTION IV (continued)

Unusual Fire and Explosion Hazards: This material may burn but does not ignite readily. Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (*Spencer 1973)

Conditions to Avoid: Hydrolyzed at pH less than 4 (*Martin and Worthing 1974)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Plant insecticide, acaricide, and miticide (*Martin and Worthing 1974, *SRI).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Keep unnecessary people away; isolate hazard areas and deny entry. Stay upwind and keep out of low areas. Do not touch spilled material or breathe the dusts, vapors, or fumes from burning materials. Do not handle broken packages without protective equipment. Wash away any material that may have contacted the body with soap and water (Student 1981, p. 104; DOT 1985, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

FORMETANATE HYDROCHLORIDE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Diarrhea, nausea, vomiting, excessive salivation, headache, pinpoint pupils and uncoordinated muscle movements are all common symptoms (*Rumack 1975 to Present).

Emergency and First Aid Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Move the victim to fresh air and monitor for respiratory distress. Although it is not absorbed through contact with the skin (Gosselin 1984, p. II-306) it is advisable to flush skin or eyes with running water for at least 15 minutes in case of contact. Remove all contaminated clothing (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PIRIMIFOS-ETHYL

CAS Registry Number: 23505-41-1

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 150) Pirimiphos- Ethyl; Phosphorothioic Acid, O,O-Diethyl O-(2-(Diethylamino)-6-Methyl-4- Pyrimidinyl) Ester; O-(2-(Diethylamino)-6-Methyl-4-Pyrimidinyl) O,O-Diethyl Phosphorothioate; 2-Diethylamino-6-Methylpyrimidin-4-yl Diethylphosphorothionate; O,O-Diethyl O-(2-Diethylamino-6-Methyl-4-Pyrimidinyl) Phosphorothioate; Fernex; Pirimifosethyl; PP211; Primicid; Primotec; Prinicid; Phosphorothioic Acid, O-(2-(Diethylamino)-6-Methyl-4-Pyrimidinyl) O,O-Diethyl Ester

Chemical Formula: $C_{13}H_{24}N_3O_3PS$

Molecular Weight: 333.43

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (cat) 25 mg/kg (*NIOSH/RTECS 1985)

TPQ: 1,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): 1.14 at 20°C (Merck 1983, p. 1082)

Vapor Pressure (mmHg): 0.00029 at 25°C (Merck 1983, p. 1082)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

PIRIMIFOS-ETHYL

SECTION II (continued)

Solubility in Water: Less than 1 mg/liter at 30°C (Merck 1983, p. 1082)

Appearance and Odor: Straw colored liquid (Merck 1983, p. 1082)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organic Phosphorus Pesticides) (Hayes 1982, p. 301)
Skin: Yes (Sax 1984, p. 1000)
Ingestion: Yes (Sax 1984, p. 1000)

Health Hazards (Acute, Delayed, and Chronic): Pirimifos-ethyl is an organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1622) and is absorbed by the skin, as well as by the respiratory and gastrointestinal tracts. It is a cholinesterase inhibitor, acting on the nervous system (Hayes 1982, p. 301).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Like other organophosphorus pesticides (Encyc Occupat Health and Safety 1983, p. 1622), this material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: Use procedures for organophosphorus pesticides (Encyc Occupat Health and Safety 1983, p. 1622). Stay upwind; keep out of low areas. Move containers from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: As with other organophosphorus pesticides (Encyc Occupat Health and Safety 1983, p. 1622), container may explode in heat of fire (DOT 1984, Guide 55). Heat may cause decomposition and evolution of highly toxic fumes of phosphorus oxides, nitrogen oxides and sulfur oxides (Sax 1984, p. 1000).

PIRIMIFOS-ETHYL

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Decomposes above 130°C (Merck 1983, p. 1082)

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides, phosphorus oxides and sulfur oxides (Sax 1984, p. 1000).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Pirimifos-ethyl is an organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1622).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

As with other organophosphorus pesticides (Encyc Occupat Health and Safety 1983, p. 1622), stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

PIRIMIFOS-ETHYL

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: As with other organophosphorus pesticides (Encyc Occupat Health and Safety 1983, p. 1622), symptoms are secondary to cholinesterase inhibition: headache, giddiness, blurred vision, nervousness, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Other signs include sweating, tearing, salivation, vomiting, cyanosis, convulsions, coma, loss of reflexes and loss of sphincter control (Hayes 1982, p. 302).

Emergency and First Aid Procedures: Treat as organophosphorus pesticide (Encyc Occupat Health and Safety 1983, p. 1622). Move victim to fresh air; 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 (DOT 1984, Guide 55).

COMMENTS

Sources searched, no information found:
Farm Chemicals Handbook 1984
Buchel 1983
Clayton and Clayton 1981-82

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRIAZOFOS

CAS Registry Number: 24017-47-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 153): Phosphorothioic Acid, O,O-Diethyl O-(1-Phenyl-1,2,4-Triazolyl) Ester; O,O-Diethyl O-(1-Phenyl-1H-1,2,4-Triazol-3-yl)Phosphorothioate; HOE 2960; HOE 2960 OJ; Hostathion; 1-Phenyl-3-(O,O-Diethyl Thionophosphoryl)-1,2,4-Triazole; 1-Phenyl-1,2,4-Triazolyl-3-(O,O-Diethyl Thionophosphate); Triazophos

Chemical Formula: $C_{12}H_{16}N_3O_3PS$

Molecular Weight: 313.34

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.28 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Decomposes before boiling (Farm Chemicals Handbook 1984, p. C123)

Specific Gravity (H_2O=1): 1.247 at 20°C/4°C (Worthing 1983)

Vapor Pressure (mmHg): 0.00001 (Worthing 1983)

Melting Point: 32-41°F, 0-5°C for technical grade (Worthing 1983)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 30-40 mg/L at 20°C (Worthing 1983)

TRIAZOFOS

SECTION II (continued)

Appearance and Odor: Yellowish oil (Worthing 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (Encyc Occupat Health and Safety 1983, p. 1622)

Health Hazards (Acute, Delayed, and Chronic): This is an organophosphate pesticide (Buchel 1983, p. 166). This material is a cholinesterase inhibitor and acts on the central nervous system (Buchel 1983, pp. 165-166). Organic phosphorus insecticides are absorbed by the skin as well as by the respiratory and gastrointestinal tracts (Hayes 1982, p. 301).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This is an organophosphate pesticide (Buchel 1983, p. 166). Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This is an organophosphate pesticide (Buchel 1983, p. 166). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: This is an organophosphate pesticide (Buchel 1983, p. 166). Some of these materials may burn but none of them

TRIAZOFOS

SECTION IV (continued)

ignite readily. Container may explode in heat of fire. Fire may produce irritating or poisonous gases (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Degraded by acids and alkalis (Farm Chemicals Handbook 1984, p. C123).

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is a pesticide used to control insects, mites, and nematodes (Buchel 1983, p. 166). Not registered as a pesticide in the U.S. (USEPA/ Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation and skin contact (see Section III above). This is an organophosphate pesticide (Buchel 1983, p. 166). Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

TRIAZOFOS

SECTION VIII (continued)

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: This is an organophosphate pesticide (Buchel 1983, p. 166). Symptoms include headache, giddiness, nervousness, blurred vision, weakness, nausea, cramps, diarrhea, chest pain, sweating, fixed pinpoint pupils, tearing, salivation, vomiting, muscle weakness and irregular heart beat (Hayes 1982, p. 301).

Emergency and First Aid Procedures: This is an organophosphate pesticide (Buchel 1983, p. 166). Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CHLORMEPHOS

CAS Registry Number: 24934-91-6

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 139) Phosphorodithioic Acid, S-(Chloromethyl) O,O-Dimethyl Ester; S-(Chloromethyl) O,O-Diethyl Phosphorodithioate; S-Chloromethyl O,O-Diethyl Phosphorothiolothionate; Dotan; MC 2188

Chemical Formula: $C_5H_{12}ClO_2PS_2$

Molecular Weight: 234.71

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 7 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 178-185°F, 81-85°C at 0.1 mmHg (Worthing 1983)

Specific Gravity (H_2O=1): 1.260 (Farm Chemicals Handbook 1984, p. C51)

Vapor Pressure (mmHg): 0.0056 at 30°C (Worthing 1983)

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Slightly soluble (Farm Chemicals Handbook 1984, p. C51); 60 mg/liter at 20°C (Worthing 1983)

CHLORMEPHOS

SECTION II (continued)

Appearance and Odor: Liquid (Farm Chemicals Handbook 1984, p. C51); colorless (Worthing 1983)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Organophosphorus Pesticide.) (Hayes 1982, p. 301)
Skin: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)
Ingestion: Yes (Non-Specific -- Organophosphorus Pesticide) (Hayes 1982, p. 301)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material is poisonous; it may be fatal if inhaled, swallowed, or absorbed through the skin (DOT 1984, Guide 55).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) This material may burn, but does not ignite readily. For small fires, use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam (DOT 1984, Guide 55).

Special Fire Fighting Procedures:(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Container may explode in heat of fire. Fire and runoff from control water may produce irritating or poisonous gases (DOT 1984, Guide 55).

CHLORMEPHOS

SECTION IV (continued)

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable:
Stable: Yes (Farm Chemicals Handbook 1984, p. C51).

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

This material is a soil insecticide (Farm Chemicals Handbook 1984, p. C51). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material. Use water spray to reduce vapors. Take up small spills with sand or other noncombustible absorbent material and place in containers for later disposal. Dike far ahead of large spills for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

**Based on a chemical analog.

CHLORMEPHOS

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: (Non-Specific -- Parathion) Symptoms may include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, headache, giddiness, weakness, muscle twitching, difficult breathing, blurring or dimness of vision, and loss of muscle coordination. Death may occur from failure of the respiratory center, paralysis of the respiratory muscles, intense bronchoconstriction, or all three (Gosselin 1984, p. III-340).

Emergency and First Aid Procedures: (Non-Specific -- Organophosphorus Pesticide, Liquid, n.o.s.) Move victim to fresh air; 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 (DOT 1984, Guide 55).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- CARBAMIC ACID, METHYL-, O-(((2,4-DIMETHYL-1, 3-DITHIOLAN-2-YL)METHYLENE)AMINO)-

CAS Registry Number: 26419-73-8

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 835) 2,4-Dimethyl-1,3-Dithiolane-2-Carboxaldehyde O-(Methylcarbamoyl)Oxime; 2,4-Dimethyl-2-Formyl-1,3-Dithiolane Oxime Methylcarbamate; 1,3-Dithiolane-2-Carboxaldehyde, 2,4-Dimethyl-, O-((Methylamino)Carbonyl)Oxime; 1,3-Dithiolane-2-carboxaldehyde, 2,4-Dimethyl-, O-(Methylcarbamoyl)Oxime; Ent 27696; MBR 6168; Tirpate

Chemical Formula: $C_8H_{14}N_2O_2S_2$

Molecular Weight: 234.36

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 1 mg/kg (*NIOSH/TECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

CARBAMIC ACID, METHYL-, O-(((2,4-DIMETHYL...

SECTION II (continued)

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

CARBAMIC ACID, METHYL-, O-(((2,4-DIMETHYL...

SECTION V (continued)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Nematocide; product discontinued (Farm Chemicals Handbook 1984, p. C227).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

The following sources were searched but no information was found:

Clayton and Clayton 1981-82
Merck 1983
Sax 1984
Verschueren 1983
Weast 1979
Hayes 1982
Hawley 1981

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- SODIUM AZIDE ($Na(N_3)$)

CAS Registry Number: 26628-22-8

Synonyms: Azide; Azium; Kazoe; NSC 3072; Smite; Sodium Azide; U-3886; Hydrazoic Acid, Sodium Salt

Chemical Formula: N_3Na

Molecular Weight: 65.02 (*NIOSH 1985)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} dermal (rabbit) 20 mg/kg (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1000 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Decomposes in vacuum (*Weast 1979)

Specific Gravity (H_2O=1): 1.846 at 20°C (*Weast 1979)

Vapor Pressure (mmHg): Not Found

Melting Point: Decomposes at 275°C to sodium and nitrogen (*Weast 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 42g in 100 mL at 17°C (DASE 1980, p. 827)

Appearance and Odor: Colorless hexagonal crystals or white crystalline solid which is odorless (*Weast 1979; *Patty 1963; *Weed Science Society of America 1979)

SODIUM AZIDE ($Na(N_3)$)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Ceiling: 0.3 mg/m^3 (0.1 ppm) (ACGIH 1984, p. 31)

IDLH: Not Found

Other Limits Recommended: Not found

Routes of Entry: **Inhalation:** Yes (DASE 1980, p. 827)
Skin: Yes (Sax 1984, p. 2412)
Ingestion: Yes (Sax 1984, p. 2412)

Health Hazards (Acute, Delayed, and Chronic): Can cause death by affecting the central nervous system. Contact may cause burns to skin and eyes (*Gosselin 1976).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not flammable (Weiss 1980, p. 811)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: If material is on fire or involved in fire, use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, carbon dioxide or dry chemical (Student 1981, p. 462). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn (DOT 1984, Guide 56).

Special Fire Fighting Procedures: Personnel protection: Avoid breathing dusts and fumes from burning material. Avoid bodily contact with the material. Wear boots, protective gloves and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Evacuation: If fire becomes uncontrollable or container is exposed to direct flame, evacuate for a radius of 2500 feet (Student 1981, p. 462).

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering. Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 56).

Unusual Fire and Explosion Hazards: When heated to decomposition, it

SODIUM AZIDE ($Na(N_3)$)

SECTION IV (continued)

emits very toxic fumes of nitrogen oxides; explosive (Sax 1984, p. 2412). Forms explosive-sensitive materials with some metals such as lead, silver, mercury or copper. May form toxic hydrazoic acid fumes in fire. Containers may explode in fire (Weiss 1980, p. 811).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Yes (Sax 1984, p. 2412)
Stable:

Conditions to Avoid: Acids (Weiss 1980, p. 811)

Incompatibility (Materials to Avoid): Acids (Weiss 1980, p. 811); benzoyl chloride and potassium hydroxide; bromine; carbon disulfide; copper; lead; nitric acid; barium carbonate; sulfuric acid; chromium (II) hypochlorite, dimethyl sulfate, water, dibromomalononitrile (Sax 1984, p. 2412). Lead, silver, copper, mercury (Weiss 1980, p. 811).

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen oxides (Sax 1984, p. 2412).

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Yes (Weiss 1980, p. 811)

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Air bag inflation; preservative in diagnostic medicinals; intermediate in explosives manufacturing (Hawley 1981, p. 933). Broad-spectrum biocide, herbicide, fungicide, nematicide, soil fumigant and insecticide (*Weed Science Society of America 1979). Used in organic synthesis (*USEPA 1977), water pollution analysis (*Bretherick 1979), and in the chemical industry for various manufactured products including sponge rubber and latexes (*Sittig 1981).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation of this material (see Section III above). In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Remove and isolate contaminated clothing. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 56).

SODIUM AZIDE ($Na(N_3)$)

SECTION VII (continued)

If material is not on fire and not involved in fire, keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers (Student 1981, p. 462).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Can cause death by affecting the central nervous system. Contact on skin causes redness and pain. Contact with eyes causes redness, pain, and blurred vision. Inhalation or ingestion causes dizziness, weakness, blurred vision, slight shortness of breath, hypotension, slowed heart rate, abdominal pain and spasms. Serious cases of exposure may result in convulsions, unconsciousness and death (*Patty 1963; *Gosselin 1976; *USEPA 1977; Weiss 1980, p. 811; DASE 1980, p. 827).

Emergency and First Aid Procedures: Move victim to fresh air; 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 (DOT 1984, Guide 56).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- TRICHLORO(DICHLOROPHENYL)SILANE

CAS Registry Number: 27137-85-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 591) Silane, (Dichlorophenyl)Trichloro-; Dichloro Phenyl Trichloro Silane

Chemical Formula: $C_6H_3Cl_5Si$

Molecular Weight: 280.43

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{low} inhalation (mouse,mammal) 0.08 mg/liter/2 hours (*NIOSH/RTECS 1985)

TPQ: 500 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 500°F, 260°C (Sax 1984, p. 962)

Specific Gravity (H_2O=1): 1.562 (Sax 1984, p. 962)

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Straw colored liquid with pungent odor (Student 1981, p. 187)

TRICHLORO(DICHLOROPHENYL)SILANE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 962)
Skin: Yes (Hawley 1981, p. 338)
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Contact causes burns to skin and eyes. If inhaled, it may be harmful (DOT 1984, Guide 60). Fire may produce irritating or poisonous gases. The compound is highly toxic by inhalation (Sax 1984, p. 962) and is a strong irritant to the skin and eyes (Hawley 1981, p. 338).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 286°F (Sax 1984, p. 962)
Flammable Limits: Material will burn but requires some effort to ignite (Student 1981, p. 187).
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This material may react violently with water. Extinguish with dry chemical, carbon dioxide, water spray, fog, or foam (DOT 1984, Guide 60). Also dry sand may be used (Student 1981, p. 187).

Special Fire Fighting Procedures: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Wear self-contained (positive pressure if available) breathing apparatus and full protective clothing. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out (DOT 1984, Guide 60). Do not use water on material itself. Use spray to absorb vapors (Student 1981, p. 187).

Unusual Fire and Explosion Hazards: This material may burn but does not ignite readily. Flammable/poisonous gases may accumulate in tanks and hopper cars (DOT 1984, Guide 60). This material may ignite combustibles (wood, paper, oil, etc.). The compound is a slight fire hazard when exposed to heat or flame (Sax 1984, p. 962).

NFPA Flammability Rating: Not Found

TRICHLORO(DICHLOROPHENYL)SILANE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: It is decomposed by moisture or water to hydrochloric acid with the evolution of heat (Student 1981, p. 187).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Intermediate for silicones (Hawley 1981, p. 338).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb with sand or other combustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1984, Guide 60). Neutralize spilled material with crushed limestone, soda ash, or lime. Keep sparks, flames, and other sources of ignition away. Use water spray to knock down vapors. Do not use water on material itself. Avoid breathing vapors. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages without protective equipment (Student 1981, p. 187).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Move victim to fresh air; call emergency medical care. Remove and isolate contaminated clothing and shoes

TRICHLORO(DICHLOROPHENYL)SILANE

SECTION IX (continued)

at the site. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Keep victim quiet and maintain normal body temperature (DOT 1984, Guide 60).

COMMENT

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Weast 1979
Merck 1983
NFPA 1984
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- XYLYLENE DICHLORIDE

CAS Registry Number: 28347-13-9

Synonyms (SANSS 1983 Synonyms): Benzene, bis(Chloromethyl)-; Xylene, alpha,alpha-Dichloro-; alpha,alpha'-Dichloroxylene; bis(Chloromethyl)Benzene; Dichloroxylylene; Xylylene Chloride (Weast 1980 Synonyms, p. C-149) Benzene, 1,2-bis(Chloromethyl)-; o-Xylylene Chloride; Benzene, 1,3-bis(Chloromethyl)-; m-Xylylene Chloride; Benzene, 1,4-bis(Chloromethyl)-; p-Xylylene Chloride

Chemical Formula: $C_8H_8Cl_2$ (Weast 1979, p. C-149)

Molecular Weight: 175.07 (Weast 1979, p. C-149)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.2 mg/liter/4 hours (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: o-Isomer: 462-466°F, 239-241°C; m-Isomer: 482-491°F, 250-255°C; p-Isomer: 464-473°F, 240-245°C (decomposes) (Weast 1979, p. C-149)

Specific Gravity (H_2O=1): o-Isomer: 1.393 at 0°C; m-Isomer: 1.302 at 20°C; p-Isomer: 1.417 at 0°C (Weast 1979, p. C-149)

Vapor Pressure (mmHg): Not Found

Melting Point: o-Isomer: 131°F, 55°C; m-Isomer: 93.6°F, 34.2°C; p-Isomer: 212°F, 100°C (Weast 1979, p. C-149)

Vapor Density (AIR=1): Not Found

XYLYLENE DICHLORIDE

SECTION II (continued)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Weast 1979, p. C-149)

Appearance and Odor: o- and p-Isomers: crystalline solids (Weast 1980, p. C-149).

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

XYLYLENE DICHLORIDE

SECTION V (continued)

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Poisonous Solid, n.o.s.) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Do not touch spilled material; stop leak if you can do so without risk. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike spill for later disposal (DOT 1984, Guide 53).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	POOR/LIMITED**
CPE	GOOD/LIMITED**
Neoprene	POOR/LIMITED**
PE	POOR/LIMITED**
PVC	POOR/LIMITED**
Viton	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

*Based on qualitative performance information.
**Based on a chemical analog.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Poisonous Solid, n.o.s.) Move victim to fresh air; call emergency medical care. In case of

XYLYLENE DICHLORIDE

SECTION IX (continued)

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 (DOT 1984, Guide 53).

COMMENTS:

Sources searched but no information found:

NIOSH/RTECS 1983
ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1986
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- BROMADIOLONE

CAS Registry Number: 28772-56-7

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 965): Coumarin, 3-(3-(4'-Bromo-1,1'-Biphenyl-4-yl)-3-Hydroxy-1-Phenylpropyl)-4-Hydroxy-; 2H-1-Benzopyran-2-one, 3-(3-(4'-Bromo(1,1'-Biphenyl)-4-yl)-3-Hydroxy-1-Phenylpropyl)-4-Hydroxy-; Bromadialone; Coumarin, 3-(alpha-(p-(p-Bromophenyl)-beta-Hydroxyphenethyl)Benzyl)-4-Hydroxy-; Maki; Ratimus (Tamogram); Super-Caid; Super-Rozol; (Farm Chemicals Handbook 1984, p. C-36): Bromone; Canadien 2000; Contrac; Termus; Sup'operats

Chemical Formula: $C_{30}H_{23}BrO_4$

Molecular Weight: 527.44

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 1.125 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: 392-410°F, 200-210°C (Merck 1983, p. 191)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Insoluble (Merck 1983, p. 191)

BROMADIOLONE

SECTION II (continued)

Appearance and Odor: Yellowish powder (Merck 1983, p. 191)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 517)

Health Hazards (Acute, Delayed, and Chronic): The compound is toxic by oral exposure (Sax 1984, p. 517).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Small fires: dry chemicals, carbon dioxide, water spray or foam. Large fires: water spray, fog or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) This material may burn but does not ignite readily. Container may explode in heat of fire. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site. If water pollution occurs, notify appropriate authorities (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Coumarin Derivative Pesticide, Solid, n.o.s.) Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

BROMADIOLONE

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits toxic fumes of bromine containing compounds (Sax 1984, p. 517).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Anticoagulant rodenticide (Merck 1983, p. 191). It is bait for rodent control used against house mice, roof rats, warfarin-resistant Norway rats. It is also authorized by USDA for use in official establishments operating under the Federal meat, poultry, shell egg grading and egg products inspection program (Farm Chemicals Handbook 1984, p. C-36).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Coumarin Derivative, Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb with sand or other non-combustible 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SUIT MATERIAL PERFORMANCE (Based on EPA/USCG "Guidelines", 1987)
(Chemical Resistance/Amount of Data)

Butyl/Neoprene	GOOD/LIMITED**
Viton	GOOD/LIMITED**
Viton/Neoprene	GOOD/LIMITED**

**Based on a chemical analog.

BROMADIOLONE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

See Emergency First Aid Treatment Guide

Emergency First Aid Treatment Guide for BROMADIOLONE

(28772-56-7)

This guide should not be construed to authorize emergency personnel to perform the procedures or activities indicated or implied. Care of persons exposed to toxic chemicals must be directed by a physician or other recognized authority.

Substance Characteristics:

Pure Form - Yellowish powder.

Commercial Form - 97% pure yellowish powder.

Use - Rodenticide.

Other Names - Bromone; Contrac; coumarin, 3-(3-(4'-bromo-1,1'-biphenyl-4-yl) -3-hydroxy-1-phenylpropyl)-4-hydroxy; Maki; Ratimus; Super-Caid; Sup'operats; Termus.

Personal Protective Equipment: See Chemical Profile Section VIII.

Emergency Life-Support Equipment and Supplies That May Be Required:

Compressed oxygen, forced-oxygen mask, soap, water, syrup of Ipecac, activated charcoal, saline cathartic or sorbitol, normal saline, D5W, Ringer's lactate, vitamin K (phytonadione).

Signs and Symptoms of Acute Bromadiolone Exposure:

Bromadiolone is an anticoagulant. Hemorrhage is the most common effect and may be manifested by nose bleeding, gum bleeding, bloody stools and urine, ecchymoses (extravasations of blood into skin), and hemoptysis (coughing up of blood). Bruising is heightened. Abdominal and flank pain are also common.

BROMADIOLONE

Emergency Life-Support Procedures:

Acute exposure to bromadiolone may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

Inhalation Exposure:

1. Move victims to fresh air. Emergency personnel should avoid self-exposure to bromadiolone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

4. RUSH to a health care facility.

Dermal/Eye Exposure:

1. Remove victims from exposure. Emergency personnel should avoid self-exposure to bromadiolone.

2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

3. Remove contaminated clothing as soon as possible.

4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

5. Wash exposed skin areas twice with soap and water.

6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

7. RUSH to a health care facility.

BROMADIOLONE

Ingestion Exposure:

1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of bromadiolone is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 4. Ipecac should not be administered to children under 6 months of age.

   Warning: *Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 4.*

   The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

6. RUSH to a health care facility.

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- METHACRYLOYLOXYETHYL ISOCYANATE

CAS Registry Number: 30674-80-7

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 2, p. 670): Methacrylic Acid, 2-Isocyanatoethyl Ester; beta-Isocyanoethyl Methacrylate; 2-Isocyanatoethyl Methacrylate; 2-Propenoic Acid, 2-Methyl-, 2-Isocyanatoethyl Ester

Chemical Formula: $C_7H_9NO_3$

Molecular Weight: 155.17

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.15 mg/liter/1 hour (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

METHACRYLOYLOXYETHYL ISOCYANATE

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Non-Specific -- Isocyanates and Solutions, n.o.s. (Flammable, Poisonous)) (DOT 1984, Guide 57)
Skin: Yes (Non-Specific -- Isocyanates and Solutions, n.o.s. (Flammable, Poisonous)) (DOT 1984, Guide 57)
Ingestion: Yes (Non-Specific -- Isocyanates and Solutions, n.o.s. (Flammable, Poisonous)) (DOT 1984, Guide 57)

Health Hazards (Acute, Delayed, and Chronic): (Non-Specific -- Isocyanates and Solutions, n.o.s. (Flammable, Poisonous)) Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes (DOT 1984, Guide 57).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Isocyanates and solutions, n.o.s. (Flammable, Poisonous)) Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam (DOT 1984, Guide 57).

Special Fire Fighting Procedures: (Non-Specific -- Isocyanates and Solutions, n.o.s. (Flammable, Poisonous)) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Move container from fire area if you can do it without risk. Cool containers that are exposed to flames with water from the side until well after fire is out. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 57).

Unusual Fire and Explosion Hazards: (Non-Specific -- Isocyanates and Solutions, n.o.s. (Flammable, Poisonous)) May be ignited by heat, sparks, or flames. Container may explode in heat of fire. Vapor explosion and

METHACRYLOYLOXYETHYL ISOCYANATE

SECTION IV (continued)

poison hazard indoors, outdoors or in sewers. Runoff from fire control or dilution water may cause pollution (DOT 1984, Guide 57).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: Unstable: Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Isocyanates and Solutions, n.o.s. (Flammable, Poisonous)) Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 57).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

METHACRYLOYLOXYETHYL ISOCYANATE

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: (Non-Specific -- Isocyanates) Once the victim has been removed from the contaminated area the treatment is symptomatic. Oxygen may be administered in acute attacks. The person must be kept quiet until respiratory symptoms disappear. When there is skin or mucous membrane contact, the affected areas must be washed copiously (Encyc Occupat Health and Safety 1983, p. 162).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- THIOFANOX

CAS Registry Number: 39196-18-4

Synonyms: 2-Butanone, 3,3-Dimethyl-1-(Methylthio)-, O-((Methylamino) Carbonyl)Oxime; 3,3-Dimethyl-1-(Methylthio)-2-Butanone O-((Methylamino) Carbonyl)Oxime; Dacamox; DS 15647; ENT 27851

Chemical Formula: $C_9H_{18}N_2O_2S$

Molecular Weight: 218.35

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 8.5 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 100 (pounds)

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): 0.00017 at 25°C (*Worthing 1979)

Melting Point: 133.7-135.5°F, 56.5-57.5°C (*Worthing 1979)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: 5.2 g/liter at 22°C (*Worthing 1979)

Appearance and Odor: Thiofanox is a colorless solid with a pungent odor (*Worthing 1979)

THIOFANOX

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Student 1981, p. 104)
Skin: Yes (Student 1981, p. 104)
Ingestion: Yes (Student 1981, p. 104)

Health Hazards (Acute, Delayed, and Chronic): This material is a carbamate pesticide (Buchel 1983, p. 134). Carbamate pesticides are moderately to highly toxic (Sax 1984, p. 631). It is a cholinesterase inhibitor (Gosselin 1984, p. III-86).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits: Non-flammable (Student 1981, p. 104)
LEL: Not Found
UEL: Not Found

Extinguishing Methods: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering. Use water spray, fog or foam. Move container from fire area (only without risk). Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Wear positive pressure breathing apparatus and special protective clothing (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: (Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Container may explode in heat of fire (DOT 1984, Guide 55).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Stable at normal storage temperature; reasonably stable to hydrolysis at less than 30C at pH 5-9 (*Worthing 1979)

THIOFANOX

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of nitrogen and sulfur oxides (Sax 1984, p. 852).

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Systemic insecticide and acaricide (*Worthing 1979)

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

(Non-Specific -- Carbamate Pesticide, Solid, n.o.s.) Do not touch spilled material; stop leak (only without risk). Use water spray to reduce vapors. Small spills: absorb with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: dike far ahead of spill for later disposal (DOT 1981, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include nausea, vomiting, abdominal cramps, diarrhea, excessive salivation, sweating, weakness, runny nose, tightness of chest (inhalation exposure), blurred vision, tearing, muscle spasm, loss of eye coordination, ocular pain, extreme dilation of the pupil, loss of muscle coordination, slurring of speech, difficulty in breathing, excessive respiratory tract mucous, lung fluid buildup, skin discoloration, and hypertension (*Gosselin 1976).

Emergency and First Aid Procedures: Establish clear airway and administer oxygen if necessary. Bathe and shampoo victim if skin and hair are contaminated. If ingested, stomach must be emptied; give syrup of ipecac to induce vomiting (*Morgan 1976).

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PHOSPHONOTHIOIC ACID, METHYL-, S-(2-(BIS (1-METHYLETHYL)AMINO)ETHYL) O-ETHYL ESTER

CAS Registry Number: 50782-69-9

Synonyms: Phosphonothioic Acid, Methyl-, S-(2-(Diisopropylamino)Ethyl) O-Ethyl Ester; S-(2-Diisopropylaminoethyl) O-Ethyl Methylphosphonothiolate; Ethyl-S-Diisopropylaminoethyl Methylthiophosphonate; Ethyl S-Dimethylamino-ethyl Methylphosphonothiolate; VX

Chemical Formula: $C_{11}H_{26}NO_2PS$

Molecular Weight: 267.37

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{low} dermal (human) 0.086 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Liquid

Boiling Point: 568°F, 298°C (decomposes) (U.S. Army 1975, p. 3-5)

Specific Gravity (H_2O=1): 1.0083 g/mL at 25°C (U.S. Army 1975, p. 3-5)

Vapor Pressure (mmHg): 0.0007 at 25°C (U.S. Army 1975, p. 3-5)

Melting Point: Freezing point below -60°F, -51°C (U.S. Army 1975, p. 3-5)

Vapor Density (AIR=1): 9.2 (U.S. Army 1975, p. 3-5)

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

PHOSPHONOTHIOIC ACID, METHYL-, S-(2-(BIS...

SECTION II (continued)

Appearance and Odor: Odorless liquid (Merck 1983, p. 1440) with an amber color (U.S. Army 1975, p. 3-5)

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (U.S. Army 1975, p. 3-5)
Skin: Yes (Sax 1984, p. 1335)
Ingestion: Yes (U.S. Army 1975, p. 3-5)

Health Hazards (Acute, Delayed, and Chronic): Cholinesterase inhibitor (Merck 1983, p. 1440). Lowest toxic oral dose (TDLO) to humans is 4 mg/kg; lowest lethal skin dose to humans (LDLO) is 86 mg/kg (NIOSH/RTECS 1983, p. 124). Death within 15 minutes after fatal dose is absorbed (U.S. Army 1975, p. 3-5).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 159°C (U.S. Army 1975, p. 3-5)
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Use protective clothing and respiratory protection (U.S. Army 1975, p. 3-5)

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:**
Stable: Yes (U.S. Army 1975, p. 3-5)

Conditions to Avoid: Extreme heat (Sax 1984, p. 1335)

Incompatibility (Materials to Avoid): Not Found

PHOSPHONOTHIOIC ACID, METHYL-, S-(2-(BIS...

SECTION V (continued)

Hazardous Decomposition or Byproducts: Highly toxic nitrogen oxides and sulfur oxides (Sax 1984, p. 1335)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Quick-acting military chemical nerve agent (U.S. Army 1975, p. 3-5).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Decontaminants include bleach slurry and hot soapy water (U.S. Army 1975, p. 3-5).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Exposure may produce red blood cell and central nervous system effects (Sax 1984, p. 1335). Other symptoms include difficulty in breathing, drooling, excessive sweating, nausea, vomiting, cramps, involuntary defecation and urination, twitching, jerking, staggering, headache, confusion, drowsiness, coma, convulsions, dimness of vision and pinpoint pupils (U.S. Army 1975, p. 3-5).

Emergency and First Aid Procedures: Immediate decontamination of the smallest drop is essential (U.S. Army 1975, p. 3-5).

COMMENTS

Sources searched, no information found:
DOT 1984
Hayes 1982
Hawley 1981
Weast 1979

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- PYRIMINIL

CAS Registry Number: 53558-25-1

Synonyms (NIOSH/RTECS 1983 Synonyms, Volume 3, p. 887): Urea, 1-Nitrophenyl-3-(3-Pyridylmethyl)-; DLP-87; DLP 787; N-(4-Nitrophenyl)-N'-(3-Pyridinylmethyl)Urea; N-3-Pyridylmethyl-N'-p-Nitrophenylurea; Pyriminyl; RH-787; VACOR; Urea, N-(4-Nitrophenyl)-N'-(3-Pyridinylmethyl)-

Chemical Formula: $C_{13}H_{12}N_4O_3$

Molecular Weight: 272.29

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 6.2 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): No

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Decomposes at 433°F, 223°C (Hayes 1982, p. 503)

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Yellow, resembling corn meal (Arena 1979, p. 174)

PYRIMINIL

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Yes (Arena 1979, p. 175)

Health Hazards (Acute, Delayed, and Chronic): This chemical may cause death by cardiovascular collapse and respiratory failure (Arena 1979, p. 175). It may cause diabetes. Also it affects the central nervous system (Hayes 1982, p. 504). Human survivors regularly develop an insulin-deficient, ketosis-prone form of diabetes millitus (Gosselin 1984, p. II-351).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: This compound is a solid pesticide (Buchel 1983, p. 226). Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material (DOT 1984, Guide 55).

Special Fire Fighting Procedures: This compound is a solid pesticide (Buchel 1983, p. 226). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site (DOT 1984, Guide 55).

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

PYRIMINIL

SECTION V (continued)

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Single-dose, acute rodenticide (Farm Chemicals Handbook 1984, p. C-238). Not registered as a pesticide in the U.S. (USEPA/Pesticide Index 1985).

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

This compound is a solid pesticide (Buchel 1983, p. 226). Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Remove and isolate contaminated clothing at the site. Do not touch spilled material; stop leak if you can do so without risk. Use water spray to reduce vapors. Small spills: absorb 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 spill for later disposal (DOT 1984, Guide 55).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Symptoms include nausea, vomiting, abdominal pains, chills, mental confusion, anorexia, aching, dilated pupils, dehydration, chest pain, urinary retention, irregular heartbeat, and muscular weakness (Arena 1979, p. 175). Exposure may also result in visual disturbances, central nervous system depression and tremors (Gosselin 1984, p. II-351).

Emergency and First Aid Procedures: This compound is a solid pesticide (Buchel 1983, p. 226). Move victim to fresh air; call emergency medical

PYRIMINIL

SECTION IX (continued)

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 (DOT 1984, Guide 55).

COMMENTS:

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
Sax 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Encyc Occupat Health and Safety 1983
Physicians' Desk Reference 1985
Gilman 1985

EPA CHEMICAL PROFILE

Date: October 31, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- ZINC, DICHLORO(4,4-DIMETHYL-5((((METHYLAMINO) CARBONYL)OXY)IMINO)PENTANENITRILE)-, (T-4)-

CAS Registry Number: 58270-08-9

Synonyms: Not Found

Chemical Formula: $C_9H_{15}Cl_2N_3O_2Zn$ (*NIOSH/RTECS 1985)

Molecular Weight: 334 (*NIOSH/RTECS 1985)

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LD_{50} oral (rat) 9 mg/kg (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Zinc Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

Appearance and Odor: Not Found

ZINC, DICHLORO(4,4-DIMETHYL-5((((METHYLAMINO)...

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Not Found
Skin: Not Found
Ingestion: Not Found

Health Hazards (Acute, Delayed, and Chronic): Not Found

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: Not Found

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: Not Found

Hazardous Polymerization: **May Occur:** Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

ZINC, DICHLORO(4,4-DIMETHYL-5((((METHYLAMINO)...

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Not Found

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

Emergency and First Aid Procedures: Not Found

COMMENTS

Sources searched but no information found:

ACGIH 1983
NIOSH/OSHA 1978
Hawley 1981
Weast 1979
Merck 1983
Sax 1984
DOT 1984
NFPA 1984
Student 1981
Weiss 1980
CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983
Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985
NIOSH/RTECS 1983

EPA CHEMICAL PROFILE

Date: October 9, 1985
Revision: November 30, 1987

CHEMICAL IDENTITY -- COBALT, ((2,2'-(1,2-ETHANEDIYLBIS (NITRILOMETHYLIDYNE))BIS(6-FLUOROPHENOLATO))(2-)-N,N',O,O')-, (SP-4-2)

CAS Registry Number: 62207-76-5

Synonyms: (NIOSH/RTECS 1983 Synonyms, Volume 1, p. 950) Cobalt (II), N,N'-Ethylenebis(3-Fluorosalicylideneiminato)-; Cobalt, Bis(3-Fluorosalicylaldehyde)Ethylenediimine-; N,N'-Ethylenebis(3-Fluorosalicylideneiminato)Cobalt II; Fluomine; Fluomine Dust

Chemical Formula: $C_{16}H_{12}CoF_2N_2O_2$

Molecular Weight: 361.23

SECTION I -- REGULATORY INFORMATION

CERCLA (SARA) 1986:

Toxicity Value Used for Listing Under Section 302: LC_{50} inhalation (rat) 0.112 mg/liter/6 hours (*NIOSH/RTECS 1985)

TPQ: 100/10,000 (pounds)

RQ: 1 (pounds)
(statutory, for notification under SARA Section 304(a)(2))

Section 313 Listed (Yes or No): In Cobalt Compounds category

SECTION II -- PHYSICAL/CHEMICAL CHARACTERISTICS

Physical State: Solid

Boiling Point: Not Found

Specific Gravity (H_2O=1): Not Found

Vapor Pressure (mmHg): Not Found

Melting Point: Not Found

Vapor Density (AIR=1): Not Found

Evaporation Rate (Butyl acetate=1): Not Found

Solubility in Water: Not Found

COBALT, ((2,2'-(1,2-ETHANEDIYLBIS...

SECTION II (continued)

Appearance and Odor: Not Found

SECTION III -- HEALTH HAZARD DATA

OSHA PEL: Not Found

ACGIH TLV: Not Found

IDLH: Not Found

Other Limits Recommended: Not Found

Routes of Entry: **Inhalation:** Yes (Sax 1984, p. 1339)
Skin: Not Found
Ingestion: Yes (Sax 1984, p. 1339)

Health Hazards (Acute, Delayed, and Chronic): This material is highly toxic by oral ingestion or inhalation (Sax 1984, p. 1339).

Medical Conditions Generally Aggravated by Exposure: Not Found

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Not Found
Flammable Limits:
LEL: Not Found
UEL: Not Found

Extinguishing Methods: Not Found

Special Fire Fighting Procedures: Not Found

Unusual Fire and Explosion Hazards: When heated to decomposition, it emits very toxic fumes of fluorine containing compounds and nitrogen oxides (Sax 1984, p. 1339).

NFPA Flammability Rating: Not Found

SECTION V -- REACTIVITY DATA

Stability: **Unstable:** Not Found
Stable: Not Found

Conditions to Avoid: Not Found

Incompatibility (Materials to Avoid): Not Found

Hazardous Decomposition or Byproducts: When heated to decomposition, it emits very toxic fumes of fluorine containing compounds and nitrogen oxides (Sax 1984, p. 1339).

COBALT, ((2,2'-(1,2-ETHANEDIYLBIS...

SECTION V (continued)

Hazardous Polymerization: May Occur: Not Found
May Not Occur: Not Found

Conditions to Avoid: Not Found

SECTION VI -- USE INFORMATION

Not Found

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE
(Steps to be Taken in Case Material is Released or Spilled)

Avoid inhalation (see Section III above).

SECTION VIII -- PROTECTIVE EQUIPMENT FOR EMERGENCY SITUATIONS

For emergency situations, wear a positive pressure, pressure-demand, full facepiece self-contained breathing apparatus (SCBA) or pressure-demand supplied air respirator with escape SCBA and a fully-encapsulating, chemical resistant suit. See the introductory information section at the beginning of the profiles for additional information.

SECTION IX -- EMERGENCY TREATMENT INFORMATION

Signs and Symptoms of Exposure: Not Found

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CHRIS 1978
Doull 1980
Clayton and Clayton 1981-82
Arena 1979
Gosselin 1984
Encyc Occupat Health and Safety 1983
Buchel 1983

COBALT, ((2,2'-(1,2-ETHANEDIYLBIS...

COMMENTS (continued)

Farm Chemicals Handbook 1984
Hayes 1982
Physicians' Desk Reference 1985
Gilman 1985