N00210.AR.000057
5090.3a
NTC Great Lakes

Hazardous Substances Data For Contaminants of Potential Concern Health and Safety Plan Fire Fighting Training Unit Naval Training Center Great Lakes, Illinois

VOLUME II

Northern Division
Naval Facilities Engineering Command
Contract No. 3N68950-95-D9021
Beling File #29646

June 1997

APPENDIX A
CONTAMINANTS OF POTENTIAL CONCERN
HAZARD SUMMARY

CONTAMINANT	HAZARD SUMMARY	PPE
Acenaphthene	Irritating to eyes, skin, and mucous membranes	Impervious clothing and gloves; safety glasses or goggles.
Aldrin	Highly toxic, may be fatal if inhaled, swallowed, or absorbed through skin	Rubber or PVC gloves, rubber boots, impervious clothing.
Arsenic	Highly toxic, may be fatal if inhaled, swallowed, or absorbed through skin. Arsenical dusts are irritating to upper respiratory tract and eyes. Human carcinogen.	Protective clothing and boots; safety glasses or goggles.
Barium	Inhalation or contact with vapors, substance, or decomposition products may cause severe injury or death.	Rubber gloves, rubber protective clothing, goggles.
Benz(a)anthracene	Probable human carcinogen	Protective clothing, gloves, and boots.
Benz(g,h,i)perylene	No information available	
Benzene	Toxic if inhaled or absorbed through skin. Irritating to eyes, skin, respiratory tract. Human carcinogen.	Protective clothing, nitrile gloves, and boots; safety glasses or goggles.
Benzo(a)pyrene	Probable human carcinogen.	Protective clothing, gloves, and boots.
Benzo(b)fluoranthene	Possible human carcinogen.	Protective clothing, gloves, and boots.
bis(2-Ethylhexyl) phthalate	Possible human carcinogen.	Protective clothing, gloves, and boots.
sec-Butylbenzene	No information available	
Butyl benzyl phthalate	Prolonged contact with liquid causes some irritation of eyes and skin.	Protective gloves and goggles.
Cadmium	Toxic by inhalation and ingestion. Human carcinogen.	Protective clothing, gloves, and boots.
Carbazole	No information available	
Chlordane	Toxic by inhalation, ingestion, or skin absorption. Possible human carcinogen.	Rubber gloves, impervious clothing.

APPENDIX A
CONTAMINANTS OF POTENTIAL CONCERN
HAZARD SUMMARY

CONTAMINANT	HAZARD SUMMARY	PPE
Chromium	Upper respiratory tract irritation.	Impervious clothing, gloves.
Chrysene	Possible human carcinogen.	Protective clothing, gloves, and boots.
2,4-D	Highly toxic, may be fatal if inhaled, swallowed, or absorbed through skin. Possible human carcinogen.	Protective clothing, gloves, and boots.
4,4-DDD	Toxic by inhalation, ingestion, or dermal contact. Possible human carcinogen.	Protective clothing, rubber gloves, and boots.
4,4-DDE	Toxic by inhalation, ingestion, or dermal contact. Possible human carcinogen.	Protective clothing, gloves, and boots.
4,4-DDT	Highly toxic by inhalation, ingestion, or skin contact. Possible human carcinogen.	Protective clothing, neoprene gloves, and boots.
Dibenz(a,h)anthracene	Possible human carcinogen.	Protective clothing, gloves, and boots.
Dibenzofuran	No information available	
1,2-Dibromo-3-chloropropane	Irritating to skin, mucous membranes. Possible human carcinogen.	Protective clothing, gloves, and boots.
Di-n-butylphthalate	Toxic by inhalation, ingestion, and dermal contact.	Protective clothing, gloves, and boots.
Dichloropropene	Intensely irritating to eyes, skin, and mucous membranes.	Protective clothing, gloves, and boots; safety glasses or goggles.
Dieldrin	Highly toxic by inhalation, ingestion, or skin absorption.	Protective clothing, rubber or PVC gloves, and boots.
Diethyl phthalate	Irritating to skin, eyes, respiratory tract.	Protective clothing, rubber gloves, and boots; safety glasses or goggles.

APPENDIX A
CONTAMINANTS OF POTENTIAL CONCERN
HAZARD SUMMARY

CONTAMINANT	HAZARD SUMMARY	PPE
2,4-Dimethylphenol	Toxic by inhalation, ingestion, or skin contact.	Protective clothing, butyl rubber or neoprene gloves, and boots.
Dinoseb	Poisonous; may be fatal if inhaled, swallowed, or absorbed through skin.	Protective clothing, gloves, and boots.
Di-n-octylphthalate	Irritating to mucous membranes.	Protective clothing, gloves, and boots.
Ethyl benzene	Toxic by inhalation, ingestion, or skin contact. Irritating to skin, eyes, and mucous membranes.	Protective clothing, nitrile gloves, and boots; safety glasses or goggles.
Fluoranthene	Toxic by inhalation, ingestion, or skin contact.	Protective clothing, gloves, and boots.
Fluorene	No information available	
Heptachlor	Eye irritant. Possible human carcinogen.	Protective clothing, rubber gloves, and boots; safety glasses or goggles.
Indeno(1,2,3-cd) pyrene	Possible human carcinogen.	Protective clothing, gloves, and boots.
Iron	Toxic by inhalation.	
Isopropyl benzene	Toxic by inhalation, ingestion, or skin absorption.	Protective clothing, gloves, and boots.
p-Isopropyl toluene	Toxic by inhalation or skin absorption.	Protective clothing, rubber gloves, and boots.
Lead	Toxic by inhalation or ingestion.	Protective clothing, gloves, and boots.
Lindane (gamma and beta-BHC)	Highly toxic by inhalation, ingestion, or skin absorption.	Protective clothing, gloves, and boots.
Manganese	Toxic by inhalation or ingestion.	Protective clothing, gloves, and boots.
4-Methyl phenol	Toxic by inhalation, ingestion, or skin absorption. Fairly severe skin irritant.	Protective clothing, rubber gloves, and boots.

APPENDIX A
CONTAMINANTS OF POTENTIAL CONCERN
HAZARD SUMMARY

CONTAMINANT	HAZARD SUMMARY	PPE
Methylene chloride	Toxic by ingestion, inhalation, and skin contact. Eye, skin irritant. Possible human carcinogen.	Protective clothing, PVA gloves, and boots; safety glasses or goggles.
2-Methylnaphthalene	Toxic by ingestion, inhalation, and skin contact. Skin irritant.	Protective clothing, gloves, and boots.
Naphthalene	Toxic by ingestion, inhalation, and skin contact. Eye irritant.	Protective clothing, gloves, and boots; safety glasses or goggles.
4-Nitroaniline	Toxic by inhalation, ingestion, and skin contact. Eye, nose, and throat irritant.	Impervious clothing, gloves, and boots; safety glasses or goggles.
4-Nitrophenol	Toxic by inhalation, ingestion, and skin absorption. Irritating to eyes, nose, and throat.	Protective clothing, butyl rubber gloves, and boots; safety glasses or goggles.
Pentachlorophenol	Toxic by inhalation, ingestion, and skin contact. Eye and skin irritant. Possible human carcinogen.	Protective clothing, rubber gloves, and boots; safety glasses or goggles.
Phenanthrene	May cause photosensitization of skin.	Protective clothing, rubber gloves, and boots.
n-Propyl benzene	Toxic by inhalation, ingestion, and skin contact. Irritating to mucous membranes, eyes, nose, throat, and skin.	Protective clothing, gloves, and boots; safety glasses or goggles.
Pyrene	Skin irritant.	Protective clothing, gloves, and boots.
Selenium	Highly toxic by inhalation, ingestion, and skin absorption. Respiratory tract irritant.	Protective clothing, gloves, and boots.
2,4,5-T (Silvex)	Poisonous; may be fatal if inhaled, swallowed, or absorbed through skin. Possible human carcinogen.	Protective clothing, gloves, and boots.
Thallium	Toxic by inhalation, ingestion, and skin contact or absorption.	Protective clothing, gloves, and boots.

APPENDIX A
CONTAMINANTS OF POTENTIAL CONCERN
HAZARD SUMMARY

CONTAMINANT	HAZARD SUMMARY	PPE
Toluene	Toxic by inhalation, ingestion, and skin contact or absorption.	
1,2,4-Trichlorobenzene	Poisonous by ingestion or inhalation. Skin and eye irritation.	Protective clothing, gloves, and boots; safety glasses or goggles.
Trichlorofluoromethane	Immediately irritating to the eye.	Protective clothing, rubber gloves, and boots; safety glasses or goggles.
1,2,4-Trimethylbenzene	Toxic by inhalation and skin contact. Skin irritant.	Protective clothing, gloves, and boots.
1,3,5-Trimethylbenzene	Toxic by inhalation and skin absorption. Skin and eye irritation.	Protective clothing, gloves, and boots; safety glasses or goggles.
Xylene	Toxic by inhalation, ingestion, and skin contact.	Protective clothing, gloves, and boots.
Zinc	Skin and eye irritation.	Protective clothing, gloves, and boots; safety glasses or goggles.

Dictionary. 10th ed. New York: Van Nostrand Reinhold Co., 1981., p. 4] **PEER REVIEWED**

KIN, EYE AND RESPIRATORY IRRITATIONS

IRRITATING TO SKIN & MUCOUS MEMBRANE. [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Rheinhold, 1979., p. 331] **PEER REVIEWED**

ROTECTIVE EQUIPMENT & CLOTHING

Wear goggles when eye exposure is ... probable. ... Chemical cartridge respirator ... /OSHA approved breathing apparatus/, or supplied air respirator indicator. Precise recommendation awaits definition of allowable limits in air. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 20] **PEER REVIEWED**

ROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for coal tar pitch volatiles is as follows: Particulate concentration of 2 mg/cu m or less: A chemical cartridge respirator with an organic vapor cartridge(s) and with a fume or high efficiency, or any supplied-air respirator, or any self-contained breathing apparatus. 10 mg/cu m or less: A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s) and with a fume or high-efficiency filter, or gas mask with a chin-style or a front- or back-mounted organic vapor canister and with a full facepiece and a fume or high-efficiency filter, or any supplied-air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece. 200 mg/cu m or less: A type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode, a powered air-purifying respirator with an organic vapor cartridge and a high-efficiency particulate filter. 400 mg/cu m or less: A type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. Greater than 400 mg/cu m or entry and escape from unknown concentrations: A combination respirator which includes a type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode; Escape: Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class; any escape self-contained breathing apparatus. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

ROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face-shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with coal tar pitch volatiles. Employees should be provided with and required to use splash-proof goggles where there is any possibility of liquid coal tar volatiles contacting the eyes. /Coal tar pitch

volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

1 - HSDB

NAME OF SUBSTANCE ALDRIN

CAS REGISTRY NUMBER 309-00-2

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: Toxic; may be fatal if inhaled, ingested or absorbed through skin. Inhalation or contact with some of these materials will irritate or burn skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Highly flammable: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion and poison hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: Call Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. It may

provide little or no thermal protection. Structural firefighters' protective clothing is recommended for fire situations only; it is not effective in spill situations. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "Public safety". Fire: If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: CAUTION: All these products have a very low flash point. Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Large fires: Water spray, fog or alcohol-resistant 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

OT EMERGENCY GUIDELINES

Spill or leak: Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled

material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Small spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Aldrin, liquid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Aldrin, solid/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may

E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 3686] **PEER REVIEWED**

OTECTIVE EQUIPMENT & CLOTHING

WHEN OPENING CONTAINERS, MIXING, OR APPLYING PRODUCT, WEAR PROTECTIVE RUBBER OR PVC GLOVES, RUBBER BOOTS, & CLEAN OVERALLS. WEAR /NIOSH APPROVED/ DUST MASK WHEN HANDLING DUST CONCENTRATES. [Farm Chemicals Handbook 1992. Willoughby, OH: Meister Publishing Co., 1992. C-15] **PEER REVIEWED**

OTECTIVE EQUIPMENT & CLOTHING

Particulate Concentration: 1 mg/cu m or less: Any chemical cartridge respirator with an organic vapor cartridge(s) dust and mist filter(s) including pesticide respirators which meet the requirements of this class, or any supplied-air respirator, or any self contained breathing apparatus. 5 mg/cu m or less: A chemical cartridge respirator with a full facepiece, organic vapor cartridge(s), and dust and mist filter(s), including pesticide respirators which meet the requirements of this class, or a gas mask with a chin style or a front or back mounted organic vapor canister and dust and mist filter, including pesticide respirators which meet the requirements of this class, or any supplied air respirator with a full facepiece, helmet, or hood, or any self contained breathing apparatus with a full facepiece. 100 mg/cu m or less: A powered air purifying respirator with an organic vapor cartridge and high efficiency particulate filter, including pesticide respirators which meet the requirements of this class, or a type C supplied-air respirator operated in pressure demand or other positive pressure or continous flow mode. 200 mg/cu m or less: a type C supplied air respirator with a full facepiece operated in pressure demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous flow mode. Greater than 200 mg/cu m or entry and escape from unknown concentrations: Self contained breathing apparatus with a full facepiece operated in pressure demand or other positive pressure mode, or a combination respirator which includes a type C supplied air respirator with a full facepiece operated in pressure demand or other positive pressure or continuous flow mode and an auxiliary self contained breathing apparatus operated in pressure demand or other positive pressure mode. Escape: Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class, or any escape self contained breathing apparatus. /Endrin/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 5] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5] **PEER REVIEWED**

ROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 8] **QC REVIEWED**

'ROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH.

NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 8] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 8] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 8] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. Respirator Classes: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 8] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Classes: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 8] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 34] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for

all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... Gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

THER PREVENTIVE MEASURES

Provide an eyewash station. Where there is any possibility of exposure of an employee's body to endrin or liquids containing endrin, facilities for quick drenching of the body should be provided within the immediate work area for emergency use. /Endrin/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

THER PREVENTIVE MEASURES

Eating and smoking should not be permitted in areas where endrin or liquids containing endrin are handled, processed, or stored. Wash hands with soap and water before eating, smoking, or using toilet facilities. /Endrin/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

THER PREVENTIVE MEASURES

Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure levels. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. In addition to respirator selection, a complete respirator protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation. /Endrin/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

THER PREVENTIVE MEASURES

Clothing which has had any possibility of being contaminated ... should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of

/material/ from the clothing. ... If clothing has had any possibility of being contaminated ... employees should change into uncontaminated clothing before leaving the work premises. If the clothing is to be laundered or otherwise cleaned to remove the endrin, the person performing the operation should be informed of its hazardous properties. /Endrin/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees should be provided with and required to use impervous clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact. ... /Endrin/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

/In case of a spill/ notify local health and wildlife officials. Also, notify operators of nearby water intakes. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 47] of Documents, GPO, February 1987., p. 47] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. [SRP] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards.

second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

ISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

)ISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known ... but 1-2 days is generally considered sufficient when freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete

reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB
NAME OF SUBSTANCE ARSENIC
CAS REGISTRY NUMBER 7440-38-2
HAZARDS SUMMARY NO DATA
DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

1 - HSDB
NAME OF SUBSTANCE ARSENIC
CAS REGISTRY NUMBER 7440-38-2
HAZARDS SUMMARY NO DATA
DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for

at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the

Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading . Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

FIRE POTENTIAL

CAN BE HEATED TO BURN IN AIR WITH BLUISH FLAME, GIVING OFF AN ODOR OF GARLIC AND DENSE WHITE FUMES OF ARSENIC TRIOXIDE (AS_2O_3). [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 116] **PEER REVIEWED**

FIRE POTENTIAL

FIRE HAZARD: MODERATE IN FORM OF DUST WHEN EXPOSED TO HEAT OR FLAME OR BY CHEMICAL REACTION WITH POWERFUL OXIDIZERS ... . [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 316] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA

LASH POINT NO DATA

TOIGNITION TEMPERATURE NO DATA

RE FIGHTING PROCEDURES

If arsenic is involved in fire: Extinguish fire using agent suitable for type of surrounding fire. Use water in flooding quantities as fog. Use foam, carbon dioxide, or dry chemical. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 65] Hazardous Materials Systems (BOE), 1987., p. 65] **PEER REVIEWED**

RE FIGHTING PROCEDURES

Wear positive pressure self contained breathing apparatus when fighting fires involving arsenic. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 64] Hazardous Materials Systems (BOE), 1987., p. 64] **PEER REVIEWED**

RE FIGHTING PROCEDURES

Wear appropriate chemical protective gloves, boots, and goggles. Wear positve pressure self contained breathing apparatus when fighting fires involving this material. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 65] Hazardous Materials Systems (BOE), 1987., p. 65] **PEER REVIEWED**

XIC COMBUSTION PRODUCTS

Fire may produce poisonous or irritating gases. [Kayser, R., D. Sterling, D. Viviani (eds.). Intermedia Priority Pollutant Guidance Documents. Washington, DC: U.S.Environmental Protection Agency, July 1982. 8-1] **PEER REVIEWED**

XIC COMBUSTION PRODUCTS

When arsenic is heated in air it will burn and form a white smoke consisting of arsenic trioxide (As_2O_3). [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 179] **PEER REVIEWED**

THER FIRE FIGHTING NO DATA

HAZARDS

XPLOSIVE LIMITS AND POTENTIAL

EXPLOSION HAZARD: SLIGHT IN THE FORM OF DUST WHEN EXPOSED TO FLAME ... [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 316] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

Lead arsenic alloys cannot be mixed in the liquid state. Addition of calcium to arsenic alloys results in a reaction between calcium and arsenic to form calcium arsenides. [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. 14(81) 150] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

Arsine is formed when any inorganic arsenic bearing material is brought in contact with zinc and sulfuric acid. [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. 3(78) 252] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Arsine may be accidentally formed by the reaction of arsenic impurities in commercial acids stored in metal tanks. ... [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. 3(78) 252] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... The /bromine azide/ liquid explodes on contact with arsenic. ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 97] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... /Rubidium acetylide/ ignites with arsenic. ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 321] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Incandescence is caused by contact with ... arsenic /and bromine trifluoride/. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 91] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

The finely powdered element /arsenic/ inflames in gaseous chlorine or liquid chlorine. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 49] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Bromine pentafluoride ... /contact/ with ... /arsenic/ at ambient or slightly elevated temperatures is violent, ignition often occurring. ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 93] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Chlorine trifluoride is a hypergolic oxidizer with recognized fuels, and contact with arsenic at ambient or slightly elevated temperatures is violent, ignition often occurring. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 898] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Palladium or zinc and arsenic react on heating with evolution of heat and light, and platinum with vivid incandescence. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 49] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... /Arsenic/ will initiate the violent and often explosive decomposition of nitrogen trichloride. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 994] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

A finely divided mixture with excess nitrate ignited when shaken out on to paper. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 13] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

The heat sensitivity of dichlorine oxide may explain the explosions which occur on contact of arsenic with this powerful oxidant. [Bretherick, L. Handbook of Reactive Chemical Hazards.

3rd ed. Boston, MA: Butterworths, 1985., p. 976] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

... Readily oxidizable materials (arsenic) form explosive mixtures /with sodium peroxide/. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1327] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

AN EXPLOSIVE VARIETY (OR CMPD) OF ARSENIC WAS PRODUCED AS SURFACE LAYER ON EXPOSED IRON SURFACE OF CORRODED LEAD-LINED VESSEL WHICH CONTAINED 35% SULFURIC ACID WITH HIGH ARSENIC CONTENT. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 49] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

A combination of finely divided arsenic with divided bromates (also chlorates & iodates) of barium, calcium, magnesium, potassium, sodium, or zinc can be exploded by heat, percussion, and, sometimes, by light friction. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-26] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

Nitrogen tribromide explodes violently in contact with arsenic. ... [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-27] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

... /Arsenic/ explodes on grinding in a mortar with the solid /potassium permanganate/. ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1244] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

A mixture of arsenic and potassium nitrate explodes when ignited. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-27] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

A mixture of rubidium carbide and arsenic ignites when heated. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-27] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

... WHEN WATER SOLN OF ARSENICALS ARE IN CONTACT WITH ACTIVE METALS SUCH AS ARSENIC, IRON, ALUMINUM, ZINC, ... HIGHLY TOXIC FUMES OF ARSENIC /INCLUDING ARSINE ARE RELEASED/. /ARSENIC COMPOUNDS/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 320] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

Srong oxidizers, bromine azide [Note: Hrdrogen gas can react with inorganic arsenic to form the highly toxic gas arsine]. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

ECOMPOSITION

When arsenic is heated in air it will burn and form a white smoke consisting of arsenic trioxide (As2O3). [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 179] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

ARSENICAL DUSTS ... ARE IRRITATING TO UPPER RESP TRACT & EYES. CONJUNCTIVITIS PRODUCED BY ... THESE SUBSTANCES ARE CHARACTERIZED BY ITCHING, BURNING, & WATERING OF EYES. ... /INORGANIC ARSENIC DUSTS/ [Grant, W.M. Toxicology of the Eye. 3rd ed. Springfield, IL: Charles C. Thomas Publisher, 1986., p. 115] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear mechanical filter respirator with hard rubber frame and surgical sheet wadding over nose and cheeks, ... boots, and long-sleeved coveralls. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 51] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Workers should be supplied with suitable protective clothing, protective boots and when there is a risk that the exposure limit for airborne arsenic will be exceeded, respiratory protective equipment. /Arsenic cmpd/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 182] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Where there is occupational exposure to inorganic arsenic compounds, protective clothing shall be provided by the employers. This may include underwear, gloves, coveralls, and a hood over the head and neck. /Inorganic arsenic/ [NIOSH; Criteria Document: Inorganic Arsenic p.5 (1975) DHEW Pub. NIOSH 75-149] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

ROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator that has a full face piece and is operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

ROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

THER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. All contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

THER PREVENTIVE MEASURES

Personnel protection: Avoid breathing dusts, and fumes from burning material. Keep upwind. Avoid bodily contact with the material. Do not handle broken packages unless wearing appropriate personal 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 appropriate chemical protective clothing. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington,

D.C.: Assoc. of American Railroads,, p. 65] Hazardous Materials Systems (BOE), 1987., p. 65] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Clean work clothes should be supplied daily and the workers should shower prior to changing to street clothes. /Arsenic and arsenic compounds/ [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 89] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Engineering controls are recommended to maintain arsenic concn below the occupational environment limit. Compliance should not be achieved by the use of respirators except during the time period necessary to install or test the required engineering controls, for nonroutine operations (such as a brief exposure to concn in excess of the limit as a result of maintenance or repair activities), or during emergencies when air concn of arsenic exceed the limit. [NIOSH; Current Intelligence Bulletin Inorganic Arsenic-Respiratory Protection #14 p.2 (1976)] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Lockers should be provided with separate compartments for work & personal clothes, & adjacent sanitary facilities of a high standard should be made available. Smoking, eating, & drinking at the workplace should not be allowed. /Arsenic & cmpd/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 182] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Due to potential skin irritation associated with respirator use and arsenic dust exposure, workmen shall be permitted to leave the work area every 2 hr to wash their face and obtain a clean respirator. /Inorganic arsenic/ [NIOSH; Criteria Document: Inorganic Arsenic p.9 (1975) DHEW Pub. NIOSH 75-149] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees exposed to arsenic shall wash their hands and exposed skin before eating or smoking during the work shift. No food shall be permitted in areas where arsenic is handled, processed, or stored. Employees shall not smoke in areas where arsenic is handled, processed, or stored. /Inorganic arsenic/ [NIOSH; Criteria Document: Inorganic Arsenic p.9 (1975) DHEW Pub. NIOSH 75-149] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Air from the exhaust ventilation system shall not be recirculated into work areas, and necessary measures shall be taken to ensure that the discharge outdoors will not produce a health hazard to humans or animals. /Inorganic arsenic/ [NIOSH; Criteria Document: Inorganic Arsenic p.9 (1975) DHEW Pub. NIOSH 75-149] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Shower baths shall be cleaned following use after each work shift. /Inorganic arsenic/ [NIOSH; Criteria Document: Inorganic Arsenic p.9 (1975) DHEW Pub. NIOSH 75-149] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Arsine may be accidentally formed by the reaction of arsenic impurities in commercial acids stored in metal tanks, so that a

test should be made for arsine before entry is made into such vessels. [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. 3(78) 252] **PEER REVIEWED**

THER PREVENTIVE MEASURES

/SRP: Contact lenses should not be worn when working with this chemical/. [CITATION] **PEER REVIEWED**

THER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

THER PREVENTIVE MEASURES

IN PLANTS WITH ARSENIC HAZARD, FLOORS ... SHOULD BE ... IMPERMEABLE ... TO PREVENT ABSORPTION & ... FLUSHED DOWN FREQUENTLY WITH WATER. WORKROOM SHOULD BE WELL VENTILATED & ALL POISONOUS FUMES SHOULD BE CONDENSED & DUST CONTENT REMOVED. ... EXHAUST HOODS ... WORKTABLES ... EQUIPPED WITH DOWN DRAFT ... VENTILATION. [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 117] **PEER REVIEWED**

THER PREVENTIVE MEASURES

If material not involved in fire: Keep material out of water sources and sewers. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 65] Hazardous Materials Systems (BOE), 1987., p. 65] **PEER REVIEWED**

THER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

THER PREVENTIVE MEASURES

The worker should wash daily at the end of each work shift. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

THER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

THER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS

(NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 20] **QC REVIEWED**

STABILITY/SHELF LIFE

LOSES ITS LUSTER ON EXPOSURE TO AIR, FORMING A BLACK MODIFICATION + AS2O3 [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 116] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 102] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6066 (1988)] **QC REVIEWED**

STORAGE CONDITIONS

Protect container against physical damage. Store in well ventilated area away from food or food products and combustible materials. /Inorganic arsenic compounds/ [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 51] **PEER REVIEWED**

CLEANUP METHODS

Solvent extraction with high molecular weight amines and quaternary ammonium compounds may be a promising technique for the removal of toxic elements like ... arsenic ... from industrial effluents. [De AK et al; Indian J Chem Sect A Inorg Phys Theor Anal 23 (2): 140-2 (1984)] **PEER REVIEWED**

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Arsenic elemental arsenic wastes should be placed in long term storage or returned to suppliers or manufacturers for reprocessing. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 89] **PEER REVIEWED**

[SPOSAL METHODS

Arsenic bearing sludges from the purification process in the production of antimony oxide are poor candidates for incineration. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-19 (1981) EPA 68-03-3025] **PEER REVIEWED**

[SPOSAL METHODS

An analysis of the health hazards associated with the operation of municipal sludge incinerators was done on the multiple hearth incinerator design, which comprises approximately 80 percent of the total number of sludge incinerators in the USA. Parameters discussed included sludge contaminant concentration, source characteristics, emission rate estimates, dispersion parameters, and health risk values. Estimates of environmental contamination by cadmium, chromium, copper, nickel, lead, and zinc due to emission loss from the incinerator were calculated. In addition, the human cancer risk (calculated as the effect index) associated with inhalation of incinerator emissions was calculated. The index values were greater than unity for arsenic, beryllium, cadmium, chromium, mercury, nickel, and lead. [Fradkin L et al; J Air Pollution Control Assoc 37 (4): 395-9 (1987)] **PEER REVIEWED**

ADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE BARIUM

CAS REGISTRY NUMBER 7440-39-3

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or explosion: Produce flammable gases on contact with water. May ignite on contact with water or moist air. Some react vigorously or explosively on contact with water. May be ignited by heat, sparks or flames. May re-ignite after fire is extinguished. Some are transported in highly flammable liquids. Runoff may create fire or explosion hazard. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-138] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Inhalation or contact with vapors, substance, or decomposition products may cause severe injury or death. May produce corrosive solutions on contact with water. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire may cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-138] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate the area before entry. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-138] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C.

(1996). G-138] **QC REVIEWED**

DT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 250 meters (800 feet). If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-138] **QC REVIEWED**

DT EMERGENCY GUIDELINES

Fire: DO NOT USE WATER OR FOAM. Small fires: Dry chemical, soda ash, lime or sand. Large fires: Dry sand, dry chemical, soda ash or lime or withdraw from area and let fire burn. Move containers from fire area if you can do it without risk. Magnesium fires: DRY sand, sodium chloride powder, graphite powder or Met-L-X powder. Lithium fires: DRY sand, sodium chloride powder, graphite powder, copper powder or Lith-X powder. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-138] **QC REVIEWED**

DT EMERGENCY GUIDELINES

Spill or leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Stop leak if you can do it without risk. Use water spray to reduce vapors or divert vapor cloud drift. DO NOT GET WATER on spilled substance or inside containers. Small spills: Cover with DRY earth, DRY sand, or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Dike for later disposal; do not apply water unless directed to do so. Powder spills: Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry. DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-138] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-138] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-138] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-138] **QC REVIEWED**

FIRE POTENTIAL

FLAMMABLE (PYROPHORIC) AT ROOM TEMP IN POWDER FORM. [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987., p. 117] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA

FIRE FIGHTING PROCEDURES

Large amt of water should be used on adjacent fires. /Soluble barium cmpd (as barium)/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

... Explosive in the form of dust when exposed to heat or flame or by chem reaction. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 3456] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

WHEN HEATED TO ABOUT 200 DEG C IN HYDROGEN, BARIUM REACTS VIOLENTLY, FORMING BARIUM HYDRIDE (BAH2). [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987., p. 117] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

BARIUM REACTS VIOLENTLY WITH ACIDS. A VIOLENT REACTION OCCURRED WHEN SMALL CHUNKS OF BARIUM WERE CLEANED BY SUBMERGING IN CHEMICALLY PURE CARBON TETRACHLORIDE. ... MIXT OF FINELY DIVIDED BARIUM METAL & ... HALOGENATED HYDROCARBONS POSSESS EXPLOSIVE CAPABILITY. SPECIFICALLY, IMPACT SENSITIVE TESTS HAVE SHOWN THAT GRANULAR BARIUM IN CONTACT WITH MONOFLUOROTRICHLOROMETHANE, TRICHLOROTRIFLUORETHANE, CARBON

TETRACHLORIDE, TRICHLOROETHYLENE, OR TETRACHLOROETHYLENE CAN DETONATE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-28] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

BARIUM /REACTS WITH/ WATER. THE HEAT OF REACTION IS SUFFICENT THAT THE EVOLVED HYDROGEN MAY IGNITE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-29] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

THE FREE METAL PRESENTS ... EXPLOSION HAZARD IF EXPOSED TO MOIST AIR OWING TO LIBERATION OF HYDROGEN. [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 1536] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

REACTS IN COLD WATER WITH EVOLUTION OF HYDROGEN GAS [Weast, R.C. (ed.) Handbook of Chemistry and Physics. 69th ed. Boca Raton, FL: CRC Press Inc., 1988-1989. B-73] **PEER REVIEWED**

EACTIVITIES & INCOMPATIBILITIES

EXTREMELY REACTIVE; REACTS READILY WITH AMMONIA, HALOGENS, OXYGEN & MOST ACIDS [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987., p. 117] **PEER REVIEWED**

ECOMPOSITION	NO DATA
OLYMERIZATION	NO DATA
THER HAZARDOUS REACTIONS	NO DATA
OOR THRESHOLD	NO DATA
KIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

ROTECTIVE EQUIPMENT & CLOTHING

Wear rubber gloves, rubber protective clothing & apron, goggles, & gas-filter mask. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 57] **PEER REVIEWED**

ROTECTIVE EQUIPMENT & CLOTHING

Respirator selection: Upper limit devices recommended by OSHA: 5 mg/cu m: any dust and mist respirator except single use and quarter mask respirators or any supplied air respirator or any self-contained breathing apparatus; 12.5 mg/cu m: any powered air purifying respirator with a dust and mist filter or any supplied air respirator operated in a continuous flow mode; 25 mg/cu m: any air purifying full facepiece respirator with a high efficiency particulate filter or any powered air purifying respirator with a tight fitting facepiece and a high efficiency particulate filter or any supplied air respirator with a tight fitting facepiece operated in a continuous flow mode or any self-contained breathing apparatus with a full facepiece or any supplied air respirator with a full facepiece; 250 mg/cu m: any supplied air respirator with a full facepiece and operated in a pressure demand or other positive pressure mode; Emergency or planned entry in unknown concn or IDLH conditions: any self-contained breathing apparatus with a full facepiece and

operated in a pressure-demand or other positive pressure mode or any supplied air respirator with a full facepiece and operated in a pressure demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure demand or other positive pressure mode; Escape: any air purifying full facepiece respirator with a high efficiency particulate filter or any appropriate escape-type self-contained breathing apparatus /Barium soluble compounds, as Ba/ [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 57] of Documents, GPO, February 1987., p. 57] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

TO KEEP DUST CONCN BELOW RECOMMENDED LEVELS, PROCESSES SHOULD BE ENCLOSED &/OR EXHAUST VENTILATION INSTALLED. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 244] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

ADEQUATE WASHING & ... SANITARY FACILITIES SHOULD BE PROVIDED ... & RIGOROUS PERSONAL HYGIENE MEASURES SHOULD BE ENCOURAGED. SMOKING & CONSUMPTION OF FOOD & BEVERAGES IN WORKSHOPS SHOULD BE PROHIBITED. FLOORS IN WORKSHOPS SHOULD BE MADE OF IMPERMEABLE MATERIALS & FREQUENTLY WASHED DOWN. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 244] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. Contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

TO KEEP DUST CONCN BELOW RECOMMENDED LEVELS, PROCESSES SHOULD BE ENCLOSED &/OR EXHAUST VENTILATION INSTALLED. ADEQUATE WASHING & OTHER SANITARY FACILITIES SHOULD BE PROVIDED ... & RIGOROUS PERSONAL HYGIENE MEASURES SHOULD BE ENCOURAGED. SMOKING & CONSUMPTION OF FOOD & BEVERAGES IN WORKSHOPS SHOULD BE PROHIBITED. FLOORS IN WORKSHOPS SHOULD BE MADE OF IMPERMEABLE MATERIALS & FREQUENTLY WASHED DOWN. /BARIUM & COMPOUNDS/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 244] **PEER REVIEWED**

STABILITY/SHELF LIFE

THE FREE ELEMENT OXIDIZES READILY IN MOIST AIR. [Friberg, L., Nordberg, G.F., Kessler, E. and Vouk, V.B. (eds). Handbook of the Toxicology of Metals. 2nd ed. Vols I, II.: Amsterdam: Elsevier Science Publishers B.V., 1986. V2 85] **PEER REVIEWED**

HIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

HIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 105] **QC REVIEWED**

HIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.4147 (1988)] **QC REVIEWED**

TORAGE CONDITIONS

STORE UNDER INERT GAS, PETROLEUM, OR OXYGEN FREE LIQUID. [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987., p. 117] **PEER REVIEWED**

TORAGE CONDITIONS

... Packaged in argon filled plastic bags inside argon filled steel containers. [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. 3(78) 460] **PEER REVIEWED**

LEANUP METHODS NO DATA

ISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

ADIATION LIMITS AND POTENTIAL

OF ISOTOPES OF BARIUM, (140)BA HAS LONGEST HALF-LIFE & CONTRIBUTES 10% OF TOTAL FISSION PRODUCTS AT 10 DAYS AFTER NUCLEAR FALL-OUT, BUT AT 60 DAYS ITS CONTRIBUTION ... /WILL BE/ 2% OF TOTAL ACTIVITY. [Browning, E. Toxicity of Industrial Metals. 2nd ed. New York: Appleton-Century-Crofts, 1969., p. 62] **PEER REVIEWED**

ADIATION LIMITS AND POTENTIAL

THIRTEEN ... RADIOACTIVE ISOTOPES ARE KNOWN TO EXIST. [Weast,

R.C. (ed.) Handbook of Chemistry and Physics. 69th ed. Boca Raton, FL: CRC Press Inc., 1988-1989. B-9] **PEER REVIEWED**

NAME OF SUBSTANCE	BENZ(A)ANTHRACENE
CAS REGISTRY NUMBER	56-55-3
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent ... Safety pipettes ... for all pipetting. ... In animal laboratory ... protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators ... when working with particulates or gases, & disposable plastic aprons ... gowns ... /should be/ of distinctive color ... . /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and

W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

THER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... also, workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

THER PREVENTIVE MEASURES

Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. [SRP] **PEER REVIEWED**

THER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

THER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive

pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be

Benz(g,h,i)perylene

No information was found in the Hazardous Substance Data Bank, National Library of Medicine.

C:\PCPLUS\97800 01/31/92

NTER DOCUMENT SELECTION._: 2-14

2

N ACCESSION NUMBER: 322. 9112.
CN CHEMICAL NAME: BENZENE.
SY SYNONYMS: BENZOL. CYCLOHEXATRIENE. COAL TAR NAPHTHA. PHENYL HYDRIDE. NCI-C55276. BENZINE. BENZOLE. ANNULENE. (6)ANNULENE. UN 1114. BENZOLENE. BICARBURET OF HYDROGEN. CARBON OIL. COAL NAPHTHA. STCC 4908110. MOTOR BENZOL. RCRA U019. PHENE. PYROBENZOL. PYROBENZOLE.
RN CAS NUMBER: 71-43-2.

REG. TOXIC NUMBER: CY1400000.

CHEMICAL FORMULA: C6H6.

D

PHYSICAL DESCRIPTION:
COLORLESS TO LIGHT YELLOW LIQUID WITH AN AROMATIC ODOR.

MOL WT:	78.08
BOILING PT:	176 F (80 C)
SOLUBILITY:	0.18% @ 25 C
FLASH PT:	12 F (-11 C)
VAPOR PRES:	74.6 MMHG
MELT PT:	42 F (6 C)
UEL IN AIR:	7.9%
LEL IN AIR:	1.3%
MEC IN AIR:	928 F (498 C)
SPEC GRAVITY:	0.877
VAPOR DENSITY:	2.8
ODOR THRESHOLD:	1.5 - 5 PPM
OCTANOL/WATER CO-EFFICIENT:	2.13.

L

PERMISSABLE EXPOSURE:
1 PPM OSHA TWA; 5 PPM OSHA 15 MIN STEL; 0.5 PPM OSHA ACTION LEVEL
10 PPM ACGIH TWA;(NOIC 90-91);ACGIH A2 - SUSPECTED HUMAN CARCINOGEN
0.1 PPM NIOSH RECOMMENDED 10 HR TWA; 1 PPM NIOSH RECOMMENDED STEL
OSHA CARCINOGEN; KNOWN HUMAN CARCINOGEN (NTP)
HUMAN SUFFICIENT EVIDENCE FOR CARCINOGENICITY (IARC GROUP-1)
ANIMAL SUFFICIENT EVIDENCE FOR CARCINOGENICITY (IARC GROUP-1)
HUMAN CARCINOGEN (EPA - CATEGORY A)
REPRODUCTIVE EFFECTS DATA (RTECS); MUTAGENIC DATA (RTECS)
TUMORIGENIC DATA (RTECS)
AQUATIC TOXICITY RATING 2 (TLM96 10-100 PPM)
BLUEGILLS 24.49 PPM
CERCLA HAZARD RATINGS - TOXICITY 3 - IGNITABILITY 3 - REACTIVITY 0 - PERSISTENCE 1
TOXICOLOGY: BENZENE IS A SKIN AND EYE IRRITANT. IT IS MODERATELY TOXIC BY INGESTION AND SLIGHTLY TOXIC BY INHALATION. BENZENE IS A CENTRAL NERVOUS SYSTEM DEPRESSANT AND BONE MARROW DEPRESSANT. POISONING MAY ALSO AFFECT THE IMMUNE, HEMATOPOIETIC AND NERVOUS SYSTEMS. EXPOSURE MAY CAUSE WEAKNESS, SOMETIMES PRECEDED BY A BRIEF PERIOD OF EUPHORIA, CARDIAC ARRHYTHMIAS AND COMA. CHRONIC EXPOSURE MAY CAUSE DECREASED BLOOD PRESSURE, INCREASED SERUM BILIRUBIN LEVELS, APLASTIC ANEMIA AND IMMUNOSUPRESSION. EPIDEMILOGICAL STUDIES HAVE ESTABLISHED A RELATIONSHIP BETWEEN PROLONGED BENZENE EXPOSURE AND LEUKEMIA.
THE THRESHOLD LIMIT VALUE WAS ESTABLISHED TO PREVENT TOXIC EFFECTS.

PERSONS WITH CERTAIN IMMUNOLOGICAL TENDENCIES MAY BE AT INCREASED RISK.
ALCOHOLIC BEVERAGES MAY INCREASE TOXIC EFFECTS. STIMULANTS, SUCH AS EPINEPHRINE, MAY CAUSE CARDIAC ARRYTHMIAS.
ORL-MAN LDLO: 50 MG/KG IHL-MAN TCLO: 150 PPM/1Y-I
IHL-MAN LCLO: 2 PPH/5M IHL-HMN LCLO: 2000 PPM/5M
IHL-HMN TCLO: 100 PPM IHL-HMN LCLO: 65 MG/M3/5Y
ORL-RAT LD50: 3306 MG/KG ORL-MUS LD50: 4700 MG/KG
IHL-RAT LC50: 10,000 PPM/7H IHL-MUS LC50: 9980 PPM
IPR-RAT LD50: 2890 UG/KG IPR-MUS LD50: 340 MG/KG
ORL-DOG LDLO: 2000 MG/KG IHL-CAT LCLO: 170,000 MG/KG

OSHA STANDARD 1910.1200 HAZARD COMMUNICATION REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING, MATERIAL SAFETY DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

DANGEROUS EXPOSURE:
3000 PPM POTENTIAL
CARCINOGENOSHA/NIOSH
COLORLESS TO LIGHT YELLOW LIQU.
C
INCOMPATIBILITIES:
SEND BACK AREA EXCEDED. ACIDS (STRONG): INCOMPATIBLE ALLYL CHLORIDE WITH DICHLOROETHYL ALUMINUM OR ETHYLALUMINUM SESQUICHLORIDE: POSSIBLE EXPLOSION ARSENIC PENTAFLUORIDE + POTASSIUM METHOXIDE: EXPLOSIVE INTERACTION BASES (STRONG): INCOMPATIBLE BROMINE PENTAFLUORIDE: FIRE AND EXPLOSION HAZARD BROMINE TRIFLUORIDE: POSSIBLE EXPLOSION OR IGNITION BROMINE + IRON: INCOMPATIBLE CHLORINE: EXPLOSION IN THE PRESENCE OF LIGHT CHLORINE TRIFLUORIDE: VIOLENT REACTION WITH POSSIBLE EXPLOSION CHROMIC ANHYDRIDE (POWDERED): IGNITION DIBORANE: SPONTANEOUSLY EXPLOSIVE REACTION IN AIR DIOXYGEN DIFLUOROBORATE: IGNITION REACTION DIOXYGENYL TETRAFLUOROBORATE: IGNITION REACTION INTERHALOGEN COMPOUNDS: IGNITION OR EXPLOSION IODINE HEPTAFLUORIDE: IGNITION ON CONTACT IODINE PENTAFLUORIDE: VIOLENT INTERACTION ABOVE 50 C NITRIC ACID: VIOLENT OR EXPLOSIVE UNLESS PROPERLY AGITATED AND COOLED NITRYL PERCHLORATE: EXPLOSIVE INTERACTION OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD OXYGEN (LIQUID): EXPLOSIVE MIXTURE OZONE: FORMATION OF GELATINOUS OZONIDE PERCHLORATES (METAL): FORMATION OF EXPLOSIVE COMPLEX.
IL
CLOTHING:
29CFR1910.1028 BENZENE PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT SHALL BE WORN WHERE APPROPRIATE TO PREVENT EYE CONTACT AND LIMIT DERMAL EXPOSURE TO LIQUID BENZENE. PROTECTIVE CLOTHING AND EQUIPMENT SHALL BE PROVIDED BY THE EMPLOYER AT NO COST TO THE EMPLOYEE AND THE EMPLOYER SHALL ASSURE ITS USE WHERE APPROPRIATE.
-ACGIH "GUIDELINES FOR THE SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATED THE FOLLOWING PROTECTIVE RATINGS FOR MATERIALS COMMONLY USED FOR PROTECTIVE CLOTHING. THESE RATINGS ARE BASED PRIMARILY ON QUANTITATIVE TEST RESULTS AND QUALITATIVE RESISTANCE INFORMATION. (THE RECOMMENDATIONS APPLY TO THE PURE SUBSTANCE ONLY; BREAKTHROUGH-TIME MAY VARY FOR MIXTURES.) (A "+" DESIGNATES A BLEND OF MATERIALS, WHILE A "/" DESIGNATES A COATED OR LAMINATED MATERIAL.) -
BENZENE: EXCELLENT/GOOD: NONE INDICATED GOOD/FAIR: VITON/NEOPRENE BUTYL/NEOPRENE POLYVINYL ACETATE SILVERSHIELD POOR/FAIR: CHLORINATED

POLYETHYLENE VITON NEOPRENE+STYRENE-BUTADIENE RUBBER STYRENE-BUTADIENE RUBBER/NEOPRENE POOR: BUTYL RUBBER NEOPRENE NATURAL RUBBER POLYVINYL ALCOHOL POLYVINYL CHLORIDE EVA TEFLON POLYURETHANE NONWOVEN POLYETHYLENE SARANEX STYRENE-BUTADIENE RUBBER NEOPRENE/NATURAL RUBBER NITRILE+POLYVINYL CHLORIDE NITRILE RUBBER POLYETHYLENE.

WEAR EYE PROTECTION TO PREVENT:
29CFR1910.1028 BENZENE EYE AND FACE PROTECTION SHALL MEET THE REQUIREMENTS OF 29CFR1910.133.
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":
EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE SPLASH-PROOF SAFETY GOGGLES WHICH COMPLY WITH 29CFR1910.133(A)(2)-(A)(6) WHERE THIS LIQUID MAY CONTACT THE EYES.

EMPLOYEE SHOULD WASH:
NO SPECIFIC REGULATIONS UNDER 29CFR1910.
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":
EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE SKIN BECOMES WET WITH THIS SUBSTANCE PROMPTLY WASH OR SHOWER WITH SOAP OR MILD DETERGENT AND WATER TO REMOVE ANY CONTAMINANT FROM THE SKIN.

WORK CLOTHING SHOULD BE CHANGED DAILY:
NO SPECIFIC REGULATIONS UNDER 29CFR1910.
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":
NOT REQUIRED.

REMOVE CLOTHING:
NO SPECIFIC REGULATIONS UNDER 29CFR1910.
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":
EMPLOYERS SHALL ENSURE THAT ANY CLOTHING WHICH BECOMES WET WITH THIS FLAMMABLE LIQUID BE REMOVED IMMEDIATELY AND NOT REWORN UNTIL THE SUBSTANCE IS REMOVED FROM THE CLOTHING.

THE FOLLOWING EQUIPMENT SHOULD BE AVAILABLE:
NO SPECIFIC REGULATIONS UNDER 29CFR1910.
NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE SUBSTANCE AND THE PROBABILITY OF EXPOSURE, PROVIDE AN EYE WASH AND FACILITIES FOR QUICK DRENCHING OF THE BODY WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED):
BENZENE
THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENT AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29CFR1910, SUBPART Z. LESS THAN OR EQUAL TO 10 PPM - HALF-MASK AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE LESS THAN OR EQUAL TO 50 PPM - FULL FACEPIECE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES - FULL FACEPIECE GAS MASK WITH CHIN-STYLE CANISTER LESS THAN OR EQUAL TO 100 PPM - FULL FACEPIECE POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CANISTER LESS THAN OR EQUAL TO 1000 PPM - SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE IN POSITIVE-PRESSURE MODE GREATER THAN 1000 PPM OR UNKNOWN CONCENTRATION - SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE IN POSITIVE PRESSURE MODE - FULL FACEPIECE POSITIVE PRESSURE SUPPLIED-AIR RESPIRATOR WITH AUXILIARY SELF-CONTAINED AIR SUPPLY ESCAPE - ANY ORGANIC VAPOR GAS MASK - ANY SELF-CONTAINED BREATHING APPARATUS

WITH A FULL FACEPIECE FIREFIGHTING - FULL FACEPIECE SELF-CONTAINED BREATHING APPARATUS IN POSITIVE PRESSURE MODE THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS.

ANY DETECTABLE CONC
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE

ESCAPE
- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONTOR BACK-MOUNTED CANISTER)
- APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE.

S

MEDICAL SURVEILLANCE:
BENZENE 29CFR1910.1028(I) MEDICAL SURVEILLANCE THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REQUIRES EMPLOYERS TO PROVIDE A MEDICAL SURVEILLANCE PROGRAM FOR EMPLOYEES. (1) EMPLOYEES COVERED. (A) EMPLOYEES WHO ARE OR MAY BE EXPOSED TO BENZENE AT OR ABOVE THE ACTION LEVEL 30 OR MORE DAYS PER YEAR. (B) EMPLOYEES WHO ARE OR MAY BE EXPOSED TO BENZENE AT OR ABOVE THE PELS 10 OR MORE DAYS A YEAR. (C) EMPLOYEES WHO HAVE BEEN EXPOSED TO MORE THAN 10 PPM OF BENZENE FOR 30 OR MORE DAYS IN A YEAR PRIOR TO THE EFFECTIVE DATE OF THE STANDARD. (D) EMPLOYEES INVOLVED IN THE TIRE BUILDING OPERATIONS CALLED TIRE BUILDING MACHINE OPERATORS, WHO USE SOLVENTS CONTAINING GREATER THAN 0.1 PERCENT BENZENE. (2) INITIAL EXAMINATION. (A) A DETAILED OCCUPATIONAL HISTORY WHICH INCLUDES: (1) PAST WORK EXPOSURE TO BENZENE AND OTHER HEMATOLOGICAL TOXINS; (2) A FAMILY HISTORY OF BLOOD DYSCRASIAS INCLUDING HEMATOLOGICAL NEOPLASMS; (3) A HISTORY OF BLOOD DYSCRASIAS INCLUDING GENETIC HEMOGLOBIN ABNORMALITIES, BLEEDING ABNORMALITIES, ABNORMAL FUNCTION OF FORMED BLOOD ELEMENTS; (4) A HISTORY OF RENAL OR LIVER DYSFUNCTION; (5) A HISTORY OF MEDICINAL DRUGS ROUTINELY TAKEN; (6) A HISTORY OF PREVIOUS EXPOSURE TO IONIZING RADIATION, AND (7) EXOSURE TO MARROW TOXINS OUTSIDE OF THE ORK SITUATION. (B) COMPLETE PHYSICAL EXAMINATION. (C) LABORATORY TESTS (1) A COMPLETE BLOOD COUNT INCLUDING A LEUKOCYTE COUNT WITH DIFFERENTIAL (2) QUANTITATIVE THROMBOCYTE COUNT (3) HEMATOCRIT (4) HEMOGLOBIN (5) ERYTHROCYTE COUNT (6) ERYTHROCYTE INDICES (MCV,MCH,MCHC) (D) ADDITIONAL TEST AS NECESSARY IN THE OPINION OF THE EXAMINING PHYSICIAN AND; (E) FOR ALL WORKERS REQUIRED TO WEAR RESPIRATORS AT LEAST 30 DAYS OR MORE A YEAR, THE PHYSICAL EXAM SHALL PAY SPECIAL ATTENTION TO THE CARDIOPULMONARY SYSTEM AND SHALL INCLUDE A PULMONARY FUNCTION TEST. (3) PERIODIC EXAMINATIONS. (A) THE EMPLOYER SHALL PROVIDE EACH COVERED EMPLOYEE WITH A MEDICAL EXAM ANNUALLY FOLLOWING THE PREVIOUS EXAM. THESE PERIODIC EXAMS SHALL INCLUDE AT LEAST THE FOLLOWING: (1) BRIEF HISTORY REGARDING NEW EXPOSURE TO POTENTIAL MARROW TOXINS, CHANGES IN DRUG USE AND THE APPEARANCE OF PHYSICAL SIGNS RELATING TO BLOOD DISORDERS; (2) A COMPLETE BLOOD COUNT INCLUDING A LEUKOCYTE COUNT WITH DIFFERENTIAL; (3)

QUANTITATIVE THROMBOCYTE COUNT; (4) HEMOGLOBIN; (5) HEMATOCRIT; (6) ERYTHROCYTE COUNT; (7) ERYTHROCYTE INDICES (MCV,MCH,MCHC) AND (8)APPROPRIATE ADDITIONAL TESTS AS NECESSARY, IN THE OPINION OF THE EXAMINING PHYSICIAN, IN CONSEQUENCE OF. (A) ALTERATIONS IN BLOOD COMPONENTS OR OTHER SIGNS WHICH MAY BE RELATED TO BENZENE EXPOSURE; (B) THE EMPLOYEE DEVELOPING SIGNS AND SYMPTOMS ASSOCIATED WITH BENZENE POISONING; (C) REQUIRED USE OF RESPIRATORS FOR AT LEAST 30 DAYS A YEAR, PULMONARY FUNCTION TEST SHALL BE PERFORMED EVERY 3 YEARS ALONG WITH A SPECIFIC EVALUATION OF THE CARDIOVASCULAR SYSTEM. (4) EMERGENCY EXAMINATIONS. IF AN EMPLOYEE IS EXPOSED TO BENZENE IN AN EMERGENCY SITUATION, THE EMPLOYEE SHALL PROVIDE A URINE SAMPLE AT THE END OF THE SHIFT AND HAVE A URINE PHENOL TEST PERFORMED ON THE SAMPLE WITHIN 72 HOURS. (A) IF THE RESULT OF THE TEST IS BELOW 75 MG PHENOL/L OF URINE, NO FURTHER TESTING IS REQUIRED. (B) IF THE RESULT OF THE URINARY PHENOL TEST IS EQUAL TO OR GREATER THAN 75 MG PHENOL/L OF URINE, THE EMPLOYER SHALL PROVIDE THE EMPLOYEE WITH: (1) A COMPLETE BLOOD COUNT INCLUDING AN ERYTHROCYTE COUNT; (2) A LEUKOCYTE COUNT WITH DIFFERENTIAL AND (3) A THROMBOCYTE COUNT AT MONTHLY INTERVALS FOR A DURATION OF THREE MONTHS FOLLOWING THE EMERGENCY EXPOSURE. (5) ADDITIONAL EXAMINATIONS AND REFERRALS. (A) WHERE THE COMPLETE BLOOD COUNT RESULTS INDICATE ANY OF THE FOLLOWING ABNORMAL CONDITIONS EXIST, THEN THE BLOOD COUNT SHALL BE REPEATED WITHIN TWO WEEKS. (1) IF THE HEMOGLOBIN LEVEL OR HEMATOCRIT FALLS BELOW THE NORMAL LIMIT AND/OR THESE INDICES SHOW A PERSISTENT DOWNWARD TREND FROM PRE-EXPOSURE NORMS; (2) THE THROMBOCYTE COUNT VARIES MORE THAN 20 PERCENT BELOW THE MOST RECENT VALUE OR FALLS OUTSIDE THE NORMAL LIMIT; (3) THE LEUKOCYTE COUNT IS BELOW 4,000 MM3 OR THERE IS AN ABNORMAL DIFFERENTIAL COUNT;.

(A) IF THE ABNORMALITY PERSISTS, THE PHYSICIAN SHALL REFER THE EMPLOYEE TO A HEMATOLOGIST/ INTERNIST FOR FURTHER EVALUATION UNLESS THE PHYSICIAN BELIEVES SUCH A REFERRAL IS UNNECESSARY. (B) THE EMPLOYER SHALL PROVIDE THE HEMOTOLOGIST/INTERNIST WITH ALL AVAILABLE MEDICAL RECORDS ON THE EMPLOYEE. (C) THE HEMATOLOGIST'S OR INTERNIST'S EVALUATION SHALL INCLUDE A DETERMINATION AS TO THE NEED FOR ADDITIONAL TESTS AND THE EMPLOYER SHALL ASSURE THESE TESTS ARE PROVIDED.

(6) INFORMATION PROVIDED TO THE PHYSICIAN. (A) A COPY OF THIS REGULATION AND ITS APPENDICES; (B) A DESCRIPTION OF THE AFFECTED EMPLOYEE'S DUTIES AS THEY RELATE TO EXPOSURE; (C) THE EMPLOYEE'S ACTUAL OR REPRESENTATIVE EXPOSURE LEVEL; (D) A DESCRIPTION OF ANY PERSONAL PROTECTIVE EQUIPMENT USED OR TO BE USED AND (E) INFORMATION FROM PREVIOUS EMPLOYMENT-RELATED MEDICAL EXAMS OF THE AFFECTED EMPLOYEE WHICH IS NOT OTHERWISE AVAILABLE TO THE EXAMINING PHYSICIAN. (7) PHYSICIANS WRITTEN OPINION. FOR EACH EXAM THE EMPLOYER SHALL OBTAIN AND PROVIDE THE EMPLOYEE WITH A COPY OF THE PHYSICIANS WRITTEN OPINION WITHIN 15 DAYS OF THE EXAM. THE WRITTEN OPINION SHALL BE LIMITED TO THE FOLLOWING: (A) THE OCCUPATIONALLY PERTINENT RESULTS OF THE MEDICAL EXAM AND TESTS; (B) PHYSICIANS OPINION CONCERNING WHETHER THE EMPLOYEE HAS ANY DETECTED MEDICAL CONDITIONS WHICH WOULD PLACE THE EMPLOYEE AT INCREASED RISK FROM EXPOSURE; (C) PHYSICIANS RECOMMENDED LIMITATIONS UPON THE EMPLOYEE'S EXPOSURE TO BENZENE OR UPON THE EMPLOYEE'S USE OF PROTECTIVE CLOTHING OR EQUIPMENT AND RESPIRATORS; AND (D) A STATEMENT THAT THE EMPLOYEE HAS BEEN INFORMED BY THE PHYSICIAN OF THE RESULTS OF THE EXAM AND ANY MEDICAL CONDITION RESULTING FROM BENZENE EXPOSURE WHICH REQUIRE FURTHER EXPLANATION OR TREATMENT. THIS STATEMENT SHALL NOT REVEAL SPECIFIC RECORDS, FINDINGS AND DIAGNOSES THAT HAVE NO BEARING ON THE EMPLOYEE'S ABILITY TO WORK IN A BENZENE-EXPOSED WORKPLACE. (8) MEDICAL REMOVAL PLAN. (A) WHEN AN EMPLOYEE HAS BEEN REFERRED TO A HEMATOLOGIST/INTERNIST THE EMPLOYEE SHALL BE REMOVED FROM AREAS WHERE EXPOSURES MAY EXCEED THE ACTION LEVEL UNTIL A DECISION IS MADE BY THE PHYSICIAN IN CONSULTATION WITH THE HEMATOLOGIST/INTERNIST TO

ALLOW THE EMPLOYEE TO RETURN. THIS DECISION SHALL BE GIVEN IN WRITING TO THE EMPLOYER AND EMPLOYEE. IN CASE OF REMOVAL, THE PHYSICIAN SHALL STATE THE PROBABLE DURATION OF REMOVAL AND THE REQUIREMENTS FOR FUTURE MEDICAL EXAMS TO REVIEW THE DECISION. (B) FOR ANY EMPLOYEE WHO IS REMOVED, THE EMPLOYER SHALL PROVIDE A FOLLOW-UP EXAM. WITHIN SIX MONTHS A DECISION SHALL BE MADE BY THE PHYSICIAN, IN CONSULTATION WITH THE HEMOTOLOGIST/ INTERNIST AS TO WHETHER THE EMPLOYEE SHALL BE RETURNED TO THE USUAL JOB OR SHOULD BE REMOVED PERMANENTLY. (C) IF AN EMPLOYEE IS TEMPORARILY REMOVED, THE EMPLOYER SHALL TRANSFER THE EMPLOYEE TO A COMPARABLE JOB THAT IS EXPOSED IN NO EVENT TO BENZENE LEVELS HIGHER THAN THE ACTION LEVEL. THE EMPLOYER SHALL MAINTAIN THE EMPLOYEE'S CURRENT WAGE RATE, SENIORITY AND OTHER BENEFITS. IF NO SUCH JOB IS AVAILABLE THE EMPLOYER SHALL PROVIDE MEDICAL REMOVAL PROTECTION BENEFITS UNTIL SUCH A JOB BECOMES AVAILABLE OR FOR SIX MONTHS, WHICHEVER COMES FIRST. (D) IF AN EMPLOYEE IS PERMANENTLY REMOVED FROM BENZENE EXPOSURE, THE EMPLOYEE SHALL BE GIVEN THE OPPORTUNITY TO TRANSFER TO ANOTHER POSITION WHICH IS AVAILABLE OR SHORTLY BECOMES AVAILABLE FOR WHICH THE EMPLOYEE IS QUALIFIED (OR CAN BE TRAINED FOR IN A SHORTTIME) AND WHERE BENZENE EXPOSURE IS AS LOW AS POSSIBLE - IN NO EVENT HIGHER THAN THE ACTION LEVEL. THE EMPLOYEE SHALL SUFFER NO REDUCTION IN CURRENT WAGE RATE, SENIORITY OR OTHER BENEFITS AS A RESULT OF THE TRANSFER. (9) MEDICAL REMOVAL PROTECTION BENEFITS. (A) THE EMPLOYEE SHALL RECEIVE SIX MONTHS OF MEDICAL REMOVAL PROTECTION BENEFITS IMMEDIATELY FOLLOWING EACH OCCASION AN EMPLOYEE IS REMOVED FROM EXPOSURE BECAUSE OF HEMATOLOGICAL FINDINGS UNLESS THE EMPLOYEE HAS BEEN TRANSFERRED TO A COMPARABLE JOB WHERE BENZENE EXPOSURE IS BELOW ACTION LEVEL. (B) FOR THE PURPOSES OF THIS SECTION, THE REQUIREMENT THAT AN EMPLOYER PROVIDE MEDICAL REMOVAL PROTECTION BENEFITS MEANS THAT THE EMPLOYER SHALL MAINTAIN THE WAGE RATE, SENIORITY AND OTHER BENEFITS OF AN EMPLOYEE AS THOUGH THE EMPLOYEE HAD NOT BEEN REMOVED. (C) THE EMPLOYERS OBLIGATION TO PROVIDE MEDICAL REMOVAL PROTECTION BENEFITS TO A REMOVED EMPLOYEE SHALL BE REDUCED TO THE EXTENT THAT THE EMPLOYEE RECEIVES COMPENSATION FOR LOST EARNINGS FROM A PUBLICLY OR AN EMPLOYER-FUNDED COMPENSATION PROGRAM, OR FROM EMPLOYMENT WITH ANOTHER EMPLOYER MADE POSSIBLE BY VIRTUE OF THE EMPLOYEE'S REMOVAL.
ACGIH BIOLOGICAL EXPOSURE INDICES FOR BENZENE: 50 MG/L TOTAL PHENOL IN URINE / TIMING -END OF SHIFT 0.08 PPM BENZENE IN MIXED EXHALED AIR / TIMING --PRIOR TO NEXT SHIFT 0.12 PPM BENZENE IN EXHALED AIR / TIMING -PRIOR TO NEXT SHIFT.
29CFR1910.20 OSHA STANDARD SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSHA ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS RELEVANT TO EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL PHYSICAL AGENTS.
53FR38140 9/29/88 (AMENDED).

RE

ROUTE OF ENTRY:
INHALATION. SKIN ABSORPTION. INGESTION. SKIN OR EYE CONTACT.

TO

TARGET ORGANS:
BLOOD. CENTRAL NERVOUS SYSTEM. SKIN. BONE MARROW. EYES. RESPIRATORY SYSTEM.

SP

SYMPTOMS:
SKIN, COVERING OF BODY (SC0174);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090).
EYE, ORGAN OF SIGHT (SC0170);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090).
MUCOUS MEMBRANE, MEMBRANE LINING PASSAGES/CAVITIES (SC0109);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090). NAUSEA, SICKNESS

AT THE STOMACH (SC0115). VOMITING, PERTAINING TO NAUSEA (SC0166). HEADACHE, PAIN IN HEAD OR CRANIUM AREA (SC0075). DIZZINESS, FEELING FAINT, LIGHT-HEADED, UNSTEADY(SC0048). DROWSINESS, FALLING ASLEEP (SC0049). WEAKNESS, LACK OF STRENGTH (SC0167). EUPHORIA, AN EXAGGERATED FEELING OF WELL-BEING (SC0061). IRRITABILITY, QUICK EXCITABILITY TO ANNOYANCE (SC0091). MALAISE, UNEASINESS, DISCOMFORT, FEELING BAD (SC0106). CONFUSION, IN A BEWILDERED STATE (SC0030). ATAXIA, MUSCULAR INCOORDINATION (SC0013). INCOORDINATION, LACK OF COORDINATION (SC0085).
CHEST, THE THORAX (SC0754);
PAIN, SUFFERING, EITHER PHYSICAL OR MENTAL (SC0182). DYSPNEA, DIFFICULTY IN BREATHING (SC0052). PALLOR, PALENESS, AS OF THE SKIN (SC0122). CYANOSIS, DARK BLUE/PURPLE SKIN COLOR (SC0038). TINNITUS, RINGING IN EARS (SC0308). BLURRED VISION, (SC0015). DELIRIUM, STATE OF DISORIENTATION, CONFUSION (SC0288).
CARDIAC, PERTAINING TO HEART (SC0023);
ARRHYTHMIA, ABSENCE OF RHYTHM; IRREGULARITY (SC0010). ANESTHESIA, LOSS OF SENSATION (SC0005). PARALYSIS, LOSS OF POWER OF VOLUNTARY MOVEMENT (SC0124). TREMORS, TREMBLING, SHAKING (SC0197). CONVULSIONS, SUDDEN MUSCLE CONTRACTIONS (SC0034). POLYNEURITIS, INFLAMMATION OF MANY NERVES (SC0624). ANOREXIA, DIMINISHED APPETITE (SC0006). INSOMNIA, INABILITY TO OBTAIN NORMAL SLEEP (SC0088). AGITATION, JERKING OF ARMS (SC0003). ERYTHEMA, REDNESS, SPOTS ON SKIN (SC0060). APLASTIC ANEMIA, ANEMIA FROM BONE MARROW DAMAGE (SC0285). ASPHYXIA, SUFFOCATION (SC0011).
CENTRAL NERVOUS SYSTEM, PERTAINING TO NEURAL BODY SYSTEM (SC0028);
DEPRESSION, DECREASE IN ACTIVITY/FUNCTION (SC0043). VENTRICULAR FIBRILLATION, RAPID CONTRACTIONS OF VENTRICLES (SC0162). FATIGUE, TIREDNESS, SLUGGISH (SC0066). FEVER, BODY TEMPERATURE ABOVE NORMAL (SC0067). HYPOTENSION, LOW BLOOD PRESSURE (SC0180). TACHYCARDIA, ABNORMAL RAPID HEARTBEAT (SC0158).
CEREBRAL, PERTAINING TO CEREBRUM (BRAIN) (SC0024);
ATROPHY, WASTING FROM MALNUTRITION (SC0196). BLOOD CHANGES, CHANGES IN BLOOD CELLS OR MORPHOLOGY (SC0227). BRUISE, IMPACT INJURY WITHOUT LACERATION (SC0779). HEMOLYSIS, BLOOD DISSOLUTION, DESTRUCTION (SC0195). LEUKEMIA, CANCER OF BLOOD CELL PRODUCTION (SC0100).
CARCINOMA, MALIGNANT CANCEROUS GROWTH (SC0365);
IN EXPERIMENTAL ANIMALS, (SC0212). MENSTRUAL DISORDERS, DISTURBANCE IN MENSES (SC0752).
REPRODUCTIVE EFFECTS, BIRTH DEFECTS (SC0281);
IN EXPERIMENTAL ANIMALS, (SC0212).
RESPIRATORY, PERTAINING TO THE LUNGS (SC0142);
FAILURE, LOSS OF FUNCTION (SC0386).
CIRCULATORY, PERTAINING TO CIRCULATION (SC0613);
COLLAPSE, EXTREME PROSTRATION (SC0029).

A

FIRST AID.

(1 OF 5)
IF-THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

(2 OF 5)
IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

1 - HSDB

NAME OF SUBSTANCE BENZO(A)PYRENE

CAS REGISTRY NUMBER 50-32-8

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: TOXIC; inhalation, ingestion, or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Chloral, anhydrous, inhibited/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. When heated, vapors may form explosive mixtures with air: indoors, outdoors, and sewers explosion hazards. Some may polymerize (P) explosively when heated or involved in a fire. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. /Chloral, anhydrous, inhibited/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. /Chloral, anhydrous, inhibited/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer.

Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. /Chloral, anhydrous, inhibited/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Chloral, anhydrous, inhibited/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Chloral, anhydrous, inhibited/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINER. /Chloral, anhydrous, inhibited/

[U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Chloral, anhydrous, inhibited/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA

FIRE FIGHTING PROCEDURES

Fire Fighting: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguishant: Foam, dry chemical, and carbon dioxide. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

When heated to decomposition it emits acrid smoke. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York,

NY: Van Nostrand Reinhold, 1984., p. 383] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS: NO DATA

EXPLOSIVE LIMITS AND POTENTIAL: NO DATA

REACTIVITIES & INCOMPATIBILITIES

Incompatibilities: Contact with strong oxidizers may cause fires and explosions. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

DECOMPOSITION: NO DATA

POLYMERIZATION: NO DATA

OTHER HAZARDOUS REACTIONS: NO DATA

ODOR THRESHOLD: NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS: NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

WHEN BENZO(A)PYRENE-CONTAINING PRODUCTS ARE HANDLED, PROTECTIVE GARMENTS SHOULD BE WORN, & ADEQUATE VENTILATION & RESPIRATORY EQUIPMENT SHOULD BE AVAILABLE. [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 3365] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face-shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with coal tar pitch volatiles. Employees should be provided with and required to use splash-proof goggles where there is any possibility of liquid coal tar volatiles contacting the eyes. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respirator Selection: Greater than any detectable concn: Any self-contained breathing apparatus with a full facepiece and operated in a pressure-demand or other positive pressure mode; or any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. Escape: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister having a high-efficiency particulate filter, or Any appropriate escape-type self-contained breathing apparatus. /Coal tar pitch volatiles/ [NIOSH. Pocket Guide to Chemical Hazards. 5th Printing/Revision. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services,, p. 85] NIOSH/Supt. of Documents, GPO, Sept. 1985., p. 85] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Areas in which exposure to coal tar pitch volatiles may occur should be identified by signs or other appropriate means, and access to these areas should be limited to authorized persons. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Workers subject to skin contact with coal tar pitch volatiles should wash with soap or mild detergent and water any areas of the body which may have contacted coal tar pitch volatiles at the end of each work day. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees who handle /materials containing/ coal tar pitch volatiles should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Clothing contaminated with coal tar pitch volatiles should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of coal tar pitch volatiles from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the coal tar pitch volatiles, the person performing the operation should be informed of coal tar pitch volatiles's hazardous properties.

Non-impervious clothing which becomes contaminated with liquid coal tar pitch volatiles should be removed immediately and not reworn until the coal tar pitch volatiles are removed from the clothing. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon,

France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

1 - HSDB

NAME OF SUBSTANCE BENZO(B)FLUORANTHENE

CAS REGISTRY NUMBER 205-99-2

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

Foam, dry chemical, and carbon dioxide. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

/During firefighting wear/ self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the

Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for coal tar pitch volatiles is as follows: Particulate concentration of 2 mg/cu m or less: A chemical cartridge respirator with an organic vapor cartridge(s) and with a fume or high efficiency, or any supplied-air respirator, or any self-contained breathing apparatus. 10 mg/cu m or less: A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s) and with a fume or high-efficiency filter, or gas mask with a chin-style or a front- or back-mounted organic vapor canister and with a full facepiece and a fume or high-efficiency filter, or any supplied-air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece. 200 mg/cu m or less: A type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode, a powered air-purifying respirator with an organic vapor cartridge and a high-efficiency particulate filter. 400 mg/cu m or less: A type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. Greater than 400 mg/cu m or entry and escape from unknown concentrations: A combination respirator which includes a type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode; Escape: Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class; any escape self-contained breathing apparatus. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face-shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with coal tar pitch volatiles. Employees should be provided with and required to use splash-proof goggles where there is any possibility of liquid coal tar volatiles contacting the eyes. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respirator selection: upper limit devices recommended by NIOSH: Greater than any detectable concn: use any self-contained breathing apparatus with a full facepiece and operated in a pressure-demand or other positive pressure mode; or any supplied-air respirator with a full facepiece and operated in

pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. Escape: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister having a high-efficiency particulate filter, or any appropriate escape-type self-contained breathing apparatus. /Coal tar pitch volatiles/ [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 85] of Documents, GPO, February 1987., p. 85] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8]

1 - HSDB

NAME OF SUBSTANCE BIS(2-ETHYLHEXYL)PHTHALATE

CAS REGISTRY NUMBER 117-81-7

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION

Health: 0. 0= Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-44] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. ... water fog gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston,

1 - HSDB

NAME OF SUBSTANCE BIS(2-ETHYLHEXYL)PHTHALATE

CAS REGISTRY NUMBER 117-81-7

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION

Health: 0. 0= Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-44] **PEER

REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. ... water fog gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-44] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-44] **PEER REVIEWED**

FLAMMABLE LIMITS

0.3% BY VOL @ 474 DEG F (245 DEG C) [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-44] **PEER REVIEWED**

FLASH POINT

420 DEG F (215 DEG C) OPEN CUP [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-44] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

735 DEG F (390 DEG C). [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-44] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

DRY POWDER, CARBON DIOXIDE, FOAM. WATER OR FOAM MAY CAUSE FROTHING. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

Nitrates; strong oxidizers, acids & alkalis. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 118] **QC REVIEWED**

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

... MAY GIVE OFF IRRITATING VAPOR @ HIGH TEMPERATURE. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

... MAY ... BE SOME NEED FOR SKIN PROTECTION. ... PROTECTION OF WORKERS IN OPERATIONS WHERE PHTHALATES ARE ... USED ... IS USUALLY DETERMINED BY PRECAUTIONS PROMPTED BY PRESENCE OF MORE TOXIC CHEMICALS. /PHTHALATES/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 1059] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 118] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 118] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 101] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature supports the wearing of contact lenses in industrial environments, as part of a program to protect the eye against chemical compounds and minerals causing eye irritation. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases contact lenses should not be worn. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SYNTH OF PHTHALATES REQUIRE GOOD VENTILATION IN ORDER TO PREVENT CONTAMINATION OF AIR WITH PHTHALIC ANHYDRIDE OR ALCOHOLS. THERE MAY BE ALSO SOME NEED FOR SKIN PROTECTION. HANDLING MINERAL ACIDS USED AS CATALYSTS REQUIRES ORDINARY PRECAUTIONS. /PHTHALATES/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 1059] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9]

Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing & use of dry dusters or mops should be prohibited. Grossly contaminated cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical

Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 11] **QC REVIEWED**

STABILITY/SHELF LIFE

STABLE [IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, V29 269 (1982)] 1972-PRESENT. (Multivolume work). V29 269 (1982)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of

transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal ... The plastic bag should be sealed immediately ... The sealed bag should be labelled properly ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **QC REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for bis(2-ethylhexyl)phthalate; biological treatment. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-63 (1982)] **QC REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for bis(2-ethylhexyl)phthalate: chemical precipitation. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-77 (1982)] **QC REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for bis(2-ethylhexyl)phthalate: solvent extraction. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-123 (1982)] **QC REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 14] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 14] **QC REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **QC REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France:

International Agency for Research on Cancer, 1979., p. 15] **QC REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known ... but 1-2 days is generally considered sufficient when freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **QC REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

sec-Butylbenzene

No information was found in the Hazardous Substance Data Bank, National Library of Medicine.

1 - HSDB

NAME OF SUBSTANCE BUTYL BENZYL PHTHALATE

CAS REGISTRY NUMBER 85-68-7

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

Slight [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 402] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 1. 1= Materials only slightly hazardous to health. It may be desirable to wear self-contained breathing apparatus. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-17] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. ... Water fog gently applied to the surface will cause a frothing which will

1 - HSDB

NAME OF SUBSTANCE BUTYL BENZYL PHTHALATE

CAS REGISTRY NUMBER 85-68-7

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

Slight [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 402] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 1. 1= Materials only slightly hazardous to health. It may be desirable to wear self-contained breathing apparatus. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-17] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. ... Water fog gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-17] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-17] **PEER REVIEWED**

FLAMMABLE LIMITS NO DATA

FLASH POINT

390 DEG F (OPEN CUP) [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.]

PEER REVIEWED

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

SPRAY OR MIST, FOAM, CARBON DIOXIDE, DRY CHEMICAL ... [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 402] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

WATER OR FOAM MAY CAUSE FROTHING. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-17] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION

When heated to decomposition, it emits acrid smoke and irritating fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 402] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

PROLONGED CONTACT WITH LIQUID CAUSES SOME IRRITATION OF EYES & SKIN. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Protective gloves and goggles. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES NO DATA

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS NO DATA

STORAGE CONDITIONS NO DATA

CLEANUP METHODS NO DATA

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Incineration: It should be atomized into an incinerator and combustion may be improved by mixing with a more flammable solvent (acetone or benzene). [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental

Programme, Dec. 1985., p. 258] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL

NO DATA

1 - HSDB

NAME OF SUBSTANCE CADMIUM

CAS REGISTRY NUMBER 7440-43-9

HAZARDS SUMMARY

The major hazards encountered in the use and handling of cadmium stem from its toxicologic properties. Toxic primarily by inhalation and ingestion, exposure to cadmium (salts, dust, or fumes) may occur from the smelting and refining of ore, and from its use in metal plating and coating, production of batteries, synthesis and use of cadmium-containing pigments, soldering, and in plastics, ceramic glazes, alloys, and amalgams. Effects from exposure may include headache, nausea, shortness of breath, chest pain, weakness, fever, kidney damage, liver damage, chronic bronchitis, emphysema, and pulmonary edema (possibly resulting in death). NIOSH has recommended that cadmium (dust and fumes) be treated as a potential human carcinogen. Further, the ACGIH has placed cadmium on its 1987-88 TLV Notice of Intended Change List as a suspected human carcinogen. The OSHA PEL for cadmium fume is 0.1 mg/cu m, and for cadmium dust is 0.2 mg Cd/cu m. Neither odor, nor irritation potential serves as an adequate warning of over-exposure. Processes and operations which may release cadmium fumes or dust should be enclosed and fitted with exhaust ventilation if practicable. Workers should wear a high efficiency particulate filter respirator or self-contained breathing apparatus in activities where over-exposure is possible. Protective clothing and gloves also should be worn, and these should be removed before leaving work. If contact should occur, immediately wash contaminated skin with large amounts of water. Do not eat, smoke, or drink in work areas. Cadmium dust or powder is a moderate firehazard when exposed to heat (autoignition temperature: 250 deg C) or flame, or by chemical reaction with oxidizing agents, metals, hydrogen azide, zinc, selenium, or tellurium. Wear a self-contained breathing apparatus when fighting such fires. Cadmium should be stored in closed containers, away from sources of physical damage. Consult the regulatory requirements of the U.S. Department of Transportation before shipping cadmium, and with environmental regulatory agencies before implementing land disposal of cadmium wastes. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health: TOXIC, inhalation, ingestion, or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.). Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY, it is not effective in spill situations. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154]

Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Cadmium compoud/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of

Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

FIRE POTENTIAL

Powdered cadmium is flammable. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 95] **PEER REVIEWED**

FIRE POTENTIAL

Fire hazard is moderate in form of dust when exposed to heat, flame, or by chem reaction with oxidizing agents, metals, hydrogen azide, zinc, selenium, and tellurium. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 610] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE

250 deg C, (482 F) layer /Cadmium metal dust/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **QC REVIEWED**

FIRE FIGHTING PROCEDURES

Fire fighting: /Wear/ self-contained breathing apparatus with a full facepiece operated in pressure-demand, or other positive mode. /Cadmium dust (as cadmium)/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

REACTS READILY WITH DIL NITRIC ACID; SLOWLY WITH HOT HYDROCHLORIC ACID; DOES NOT REACT WITH ALKALIES [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 223] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

When nitryl fluoride is passed ... over ... cadmium ... /with mild warming/, glowing white incandescence occurs. [Bretherick, L. Handbook of Reactive Chemical Hazards. 2nd ed. Boston MA: Butterworths, 1979., p. 883] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

VIOLENT EXPLOSION FOLLOWED IMMERSION OF CADMIUM ROD IN HYDRAZOIC ACID AFTER ABOUT 30 MIN. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-42] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Fused ammonium nitrate with powdered metals is often a violent and sometimes an explosive reaction ... cadmium is a metal that reacted in this way. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-22] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers; elemental sulfur, selenium & tellurium. /Cadmium dust (as Cd)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 44] **QC REVIEWED**

DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for cadmium dust (as cadmium) is as follows: 1 mg/cu m or less: any dust respirator, except single-use; 2 mg/cu m or less: any dust respirator, except single-use, or quarter mask respirator, or any high efficiency particulate filter respirator, or any supplied-air respirator, or any self-contained breathing apparatus; 10 mg/cu m or less: a high efficiency particulate filter respirator with a full facepiece, or any supplied-air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece; 40 mg/cu m or less: a powered air-purifying respirator with a high efficiency particulate filter or a type-C supplied-air respirator operated in pressure-demand, or other positive pressure, or continuous-flow mode; Greater than 40 mg/cu m or entry and escape from unknown concentration: self-contained breathing apparatus with a full facepiece operated in pressure-demand, or other positive pressure mode, or a combination respirator which includes a type-C supplied-air respirator with a full facepiece operated in pressure-demand, or other positive pressure, or continuous-flow mode and an auxillary self-contained breathing apparatus operated in pressure-demand, or other positive pressure mode; fire fighting: self-contained breathing apparatus with a full facepiece operated in pressure-demand, or other positive pressure mode; escape: any dust respirator, except single-use, or any escape self-contained breathing apparatus. /Cadmium dust (as cadmium)/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece &

close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for cadmium fume is as follows: 1 mg/cu m or less: any fume respirator, or high efficiency particulate respirator, or any supplied-air respirator, or any self-contained breathing apparatus; 5 mg/cu m or less: a high efficiency particulate filter respirator with a full facepiece, or any supplied- air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece; 40 mg/cu m or less: a powered air-purifying respirator with a high efficiency particulate filter or a type-C supplied-air respirator operated in pressure-demand, or other positive pressure, or continuous-flow mode; greater than 40 mg/cu m or entry and escape from unknown concentrations: self-contained breathing apparatus with full facepiece operated in pressure demand, or other positive pressure mode, or a combination respirator which includes a type-C supplied-air respirator with a full facepiece operated in pressure-demand, or other positive pressure, or continuous-flow mode, and an auxiliary self-contained breathing apparatus operated in pressure-demand, or other positive pressure mode; escape: a high efficiency particulate filter respirator with a full facepiece, or any escape self-contained breathing apparatus. /Cadmium fume/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 5] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

IN AREAS WITH HAZARDS OF /AIRBORNE/ PARTICLES, CHEM SPLASHES, RADIANT HEAT ... WORKERS SHOULD WEAR APPROPRIATE SAFETY EQUIPMENT SUCH AS EYE, FACE, HAND, & ARM PROTECTION & IMPERMEABLE CLOTHING. /CADMIUM & CADMIUM CMPD/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 357] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and

is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. /Cadmium dust (as Cd)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 44] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. /Cadmium dust (as Cd)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 44] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

... PROCESSES OR OPERATIONS WHICH MAY RELEASE CADMIUM FUMES OR DUST INTO ATMOSPHERE SHOULD BE DESIGNED TO KEEP CONCN LEVELS TO MINIMUM & IF PRACTICABLE BE ENCLOSED & FITTED WITH EXHAUST VENTILATION. WHEN ADEQUATE VENTILATION IS IMPOSSIBLE TO MAINTAIN, EG, DURING WELDING AND CUTTING, RESPIRATORS SHOULD BE CARRIED & AIR SAMPLED TO DETERMINE CADMIUM CONCN. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 357] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

ADEQUATE SANITARY FACILITIES SHOULD BE SUPPLIED & WORKERS SHOULD BE ENCOURAGED TO WASH THOROUGHLY & CHANGE THEIR CLOTHES BEFORE LEAVING WORK. SMOKING, EATING & DRINKING IN WORK AREAS SHOULD BE PROHIBITED. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 357] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. /Cadmium dust (as Cd)/ [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 69] of Documents, GPO, February 1987., p. 69] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in

such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

DO NOT BREATHE SPRAY MIST. ... /PROTECT/ EYES /AND/ SKIN. IF SPILLED ON SKIN, WASH OFF IMMEDIATELY WITH LARGE AMOUNTS OF WATER. WASH THOROUGHLY AFTER HANDLING. WASH CONTAMINATED CLOTHING. KEEP CHILDREN & ANIMALS OFF TREATED AREAS UNTIL WASHED INTO SOIL. /CADMIUM & CADMIUM CMPD/ [Farm Chemicals Handbook 87. Willoughby, Ohio: Meister Publishing Co., 1987. C-46] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

An eye wash fountain should be provided within the immediate work area where cadmium chloride is being used. /Cadmium metal dust/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should wash daily at the end of each work shift. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 44] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 44] **QC REVIEWED**

STABILITY/SHELF LIFE

SLOWLY OXIDIZED BY MOIST AIR TO FORM CADMIUM OXIDE [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 223] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 114] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6087 (1988)] **QC REVIEWED**

STORAGE CONDITIONS

Keep containers closed and protect against physical damage. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 96] **PEER REVIEWED**

CLEANUP METHODS NO DATA

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to impementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Recycling: Sort, classify and put in a box properly labeled. Salvage profitably for reuse by local shop or sell as a scrap metal. Recommendable method: Landfill. Not recommendable method: Thermal destruction. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 118] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE	CARBAZOLE
CAS REGISTRY NUMBER	86-74-8
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA

DECOMPOSITION

When heated to decompositon it emits toxic fumes of nitrogen oxides. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 635] **UNREVIEWED**

POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA
PROTECTIVE EQUIPMENT & CLOTHING	NO DATA
OTHER PREVENTIVE MEASURES	NO DATA
STABILITY/SHELF LIFE	NO DATA
SHIPMENT METHODS AND REGULATIONS	NO DATA

STORAGE CONDITIONS

MATERIALS WHICH ARE TOXIC AS STORED OR WHICH CAN DECOMPOSE INTO TOXIC COMPONENTS ... SHOULD BE STORED IN A COOL WELL VENTILATED PLACE, OUT OF THE DIRECT RAYS OF THE SUN, AWAY FROM AREAS OF HIGH FIRE HAZARD, & SHOULD BE PERIODICALLY INSPECTED. INCOMPATIBLE MATERIALS SHOULD BE ISOLATED ... . [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975., p. 518] **UNREVIEWED**

CLEANUP METHODS	NO DATA
DISPOSAL METHODS	NO DATA
RADIATION LIMITS AND POTENTIAL	NO DATA

1 - HSDB
NAME OF SUBSTANCE CHLORDANE
CAS REGISTRY NUMBER 57-74-9
HAZARDS SUMMARY NO DATA
DOT EMERGENCY GUIDELINES

Health: Toxic; may be fatal if inhaled, ingested or absorbed through skin. Inhalation or contact with some of these materials will irritate or burn skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Highly flammable: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion and poison hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: Call Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996

North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing is recommended for fire situations only; it is not effective in spill situations. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "Public safety". Fire: If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: CAUTION: All these products have a very low flash point. Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Large fires: Water spray, fog or alcohol-resistant 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Small spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Organochlorine pesticide, liquid, flammable,

poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of

Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of

Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS

0.7%-5% (in kerosene soln) [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II.

Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FLASH POINT

Solution: 225 deg F (open cup), 132 deg F (closed cup) [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

Fire fighting: Self-contained breathing apparatus with a full facepiece, operated in pressure-demand or other positive-pressure mode. ... [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 5] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

If material on fire or involved in fire: Use water in flooding quantities as fog. Do not extinguish fire unless flow can be stopped. 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. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 156] Hazardous Materials Systems (BOE), 1987., p. 156] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Irritating and toxic hydrogen chloride and phosgene gases may be formed when kerosene solution of compound burns. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Temperatures above 200 deg C ... formation of chlorine and hydrogen chloride gases. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

INCOMPATIBILITIES: LOSES ... CHLORINE IN PRESENCE OF ALKALINE REAGENTS ... SHOULD NOT BE FORMULATED WITH ANY SOLVENT, CARRIER, DILUENT OR EMULSIFIER, WHICH HAS ALKALINE REACTION. [Budavari, S. (ed.). The Merck Index - Encyclopedia of Chemicals, Drugs and Biologicals. Rahway, NJ: Merck and Co., Inc., 1989., p. 321] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Corrosive to iron and zinc [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. Old Woking, Surrey, United Kingdom: Royal Society of Chemistry/Unwin Brothers Ltd., 1983. A072/Oct 83] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Chlordane will attack some forms of plastics, rubber, and coatings. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, alkaline reagents [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

DECOMPOSITION

Hazardous decomposition products: Toxic gases and vapors, such as hydrogen chloride, chlorine, phosgene, and carbon monoxide. ... [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

DECOMPOSITION

Near its boiling point, chlordane decomposes to /chlorine, phosgene, and hydrogen chloride/. [NIOSH. Pocket Guide to Chemical Hazards. 5th Printing/Revision. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services,, p. 72] NIOSH/Supt. of Documents, GPO, Sept. 1985., p. 72] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS

Chlordane will attack some forms of plastics, rubber, and coatings. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

ODOR THRESHOLD

Odor low: 0.0084 mg/cu m; Odor high: 0.0419 mg/cu m [Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Technical grade chlordane ... irritating to skin and mucous membranes. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

RESPIRATOR FOR SPRAYS, FOGS, OR DUST; GOGGLES; RUBBER GLOVES. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, ... face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational

Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for chlordane is as follows: 5 mg/cu m or less: Any chemical cartridge respirator with organic vapor cartridge(s) and dust and mist filter(s), including pesticide respirators which meet the requirements of this class, or any supplied-air respirator, or any self-contained breathing apparatus; 25 mg/cu m or less: A chemical cartridge respirator with a full facepiece, organic vapor cartridges, and dust and mist filters, including pesticide respirators which meet the requirements of this class, a chin-style or front- or back-mounted pesticide gas mask or any supplied-air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece; 500 mg/cu m or less: A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode. A powered chemical cartridge respirator with an organic vapor cartridge and a high efficiency filter, including pesticide respirators which meet the requirements of this class; Greater than 500 mg/cu m or entry and escape from unknown concentrations: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode, or a combination respirator which includes a Type C supplied-air respirator with a full facepiece, operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode; Escape: Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class, or any escape self-contained breathing apparatus. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. Respirator Classes: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occuring respiratory hazards: Respirator Classes: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate

escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... Gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Clothing which has had any possibility of being contaminated with chlordane should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of the chlordane from the clothing. If the clothing is to be laundered or otherwise cleaned ... the person performing the operation should be informed of chlordane's hazardous properties. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Where there is any possibility of exposure of an employee's body to chlordane, facilities for quick drenching of the body should be provided. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Workers subject to skin contact with chlordane should wash with soap or mild detergent and water ... at the end of each work day. Eating or smoking should not be permitted in areas where chlordane is handled, processed, or stored. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

IN HANDLING CHLORDANE OR ITS FORMULATIONS CARE SHOULD BE EXERCISED TO AVOID SKIN CONTACT, INHALATION OF DUSTS OR MISTS, & INGESTION. [Farm Chemicals Handbook 1991. Willoughby, OH: Meister, 1991. C-68] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 60] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If material 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. Use water spray to disperse vapors 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. /Chlordane, liquid/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 156] Hazardous Materials Systems (BOE), 1987., p. 156] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality

assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. Contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 56] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L.

Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter.

Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing & use of dry dusters or mops should be prohibited. Grossly contaminated

cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 11] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE

DEHYDROHALOGENATES IN PRESENCE OF ALKALI [Sunshine, I. (ed.). CRC Handbook of Analytical Toxicology. Cleveland: The Chemical Rubber Co., 1969., p. 505] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport

Association, Dangerous Goods Board, January, 1995., p. 189] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3097-1, 6193, 6194, 6195 (1988)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International

Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

STORAGE CONDITIONS

Ambient temperature for storage. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **PEER REVIEWED**

STORAGE CONDITIONS

Glass or steel containers having a protective baked phenolic coating are used for packing emulsifiable concentrates, water emulsions, and oil solutions. Dusts, dust concentrates, and wettable powders are generally placed in multiwall kraft paper bags. [Farm Chemicals Handbook 1991. Willoughby, OH: Meister, 1991. C-68] **PEER REVIEWED**

CLEANUP METHODS

A PROCESS FOR REMOVING POLLUTANTS FROM DU PONT'S CHAMBERS WORKS PLANT IN DEEPWATER, NJ IS DESCRIBED. PROCESS INVOLVES NEUTRALIZATION OF WASTES & SETTLING, FOLLOWED BY COMBINED POWDERED CARBON-BIOLOGICAL PROCESS. AMONG PESTICIDES LISTED AS PRIORITY POLLUTANTS ARE HEPTACHLOR & CHLORDANE. [HUTTON DG; IND WASTES (CHICAGO) 26 (2): 22-26 (1980)] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations: Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be contained with a flexible impermeable membrane liner./ Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquids with fly ash, cement powder, sawdust, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. /Chlordane, liquid/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 156] Hazardous Materials Systems (BOE), 1987., p. 156] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations: Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Use mechanical dredges or lifts to remove

immobilized masses of pollutants and precipitates or greater concentration. /Chlordane, liquid/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 156] Hazardous Materials Systems (BOE), 1987., p. 156] **PEER REVIEWED**

CLEANUP METHODS

Absorb /small/ spills with paper towels. Place /material/ in hood to evaporate. [ITII. Toxic and Hazardous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1988., p. 113] **PEER REVIEWED**

CLEANUP METHODS

Absorb /large/ spills in vermiculite, dry sand, earth, or similar material. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations: Air spill: Apply water spray or mist to knock down vapors. Combustion products include corrosive or toxic vapors. /Chlordane, liquid/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 156] Hazardous Materials Systems (BOE), 1987., p. 156] **PEER REVIEWED**

CLEANUP METHODS

Survey reports six case histories employing EPA's hazardous materials spills treatment trailer are reviewed. The trailer's ... treatment system has three mixed-media filters and three activated carbon columns to remove suspended, precipitated, and organic soluble materials. Spills of PCB, pentachlorophenol, kepone, termide (chlordane), heptachlor, aldrin, and dieldrin, toxaphene, and dinitrobutylphenol were treated by the EPA trailer, which was generally successful in mitigating environmental effects by filtering and carbon-adsorption. 90% removal was achieved for 21 of 23 compounds. [Lafornara JP; WPCF J 50 (4): 617 (1978)] **PEER REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal ... The plastic bag should be sealed immediately ... The sealed bag should be labelled properly ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially

designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U036, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

A potential candidate for liquid injection incineration at a temperature range of 650 to 1,600 deg C and a residence time of 0.1 to 2 seconds. A potential candidate for rotary kiln incineration at a temperature range of 820 to 1,600 deg C and residence times of seconds for liquids and gases, and hours for solids. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-11 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165.9(a) (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

Group II Containers: Non-combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to a scrap metal facility for recycling, disposal or burial in a designated landfill. /Organic or metallo-organic pesticides/ [40 CFR 165.9(b) (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

No practical chemical treatment is available for chlordane at this time. The basic objection to the use of alkali treatment is that several days to weeks contact time may be required to insure complete hydrolysis. For the disposal of excess chlordane: Incineration @ 980-1100 deg C, with a residence time of a minimum of 1 sec. For the decontamination of chlordane containers, the triple rinse is recommended. "Triple rinse" means the flushing of containers three times, each time using a volume of the normal diluent equal to approx 10% of the container's capacity, and adding the rinse liquid to the spray mixture or disposing of it by a method prescribed for disposing of the pesticide. Recommendable method: Incineration. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland:

United Nations Environmental Programme, Dec. 1985., p. 208] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for chlordane: Concentration process: Biological treatment. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-55 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for chlordane: Concentration process: Activated carbon. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-169 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 14] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 14] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A.

Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known ... but 1-2 days is generally considered sufficient when freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL — NO DATA

1 - HSDB

NAME OF SUBSTANCE CHROMIUM

CAS REGISTRY NUMBER 7440-47-3

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

FIRE HAZARD: MODERATE, IN FORM OF DUST. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 790] **QC REVIEWED**

FIRE POTENTIAL

... WHEN FINELY DIVIDED BURNS RAPIDLY IF HEATED IN FLAME. [Browning, E. Toxicity of Industrial Metals. 2nd ed. New York: Appleton-Century-Crofts, 1969., p. 119] **QC REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

Respiratory protection from chromium metal and insoluble chromium salts while fighting fires: self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. /Chromium metal and insoluble chromium salts/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

FUSED AMMONIUM NITRATE WITH POWDERED METALS IS OFTEN A VIOLENT & SOMETIMES AN EXPLOSIVE REACTION. ... CHROMIUM ... REACTED IN THIS WAY. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-22] **QC REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

When /dust/ is suspended in carbon dioxide atmospheres ... /it is/ ignitable and explosive ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 192] **QC REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

MOLTEN LITHIUM AT 180 DEG C ATTACKS VANADIUM, BERYLLIUM, OR CHROMIUM SEVERELY. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-118] **QC REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

VIOLENT DECOMP OF HYDROGEN PEROXIDE (52% BY WT OR GREATER) MAY BE CAUSED BY CONTACT WITH ... CHROMIUM ... & SALTS. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-112] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

REACTS WITH DIL HYDROCHLORIC ACID, SULFURIC ACID; NOT WITH NITRIC ACID; ATTACKED BY CAUSTIC ALKALIES & ALKALI CARBONATES. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 317] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

CHROMIUM IS ATTACKED VIGOROUSLY BY FUSED POTASSIUM CHLORATE, PRODUCING VIVID INCANDESCENCE. PYROPHORIC CHROMIUM UNITES WITH SULFUR DIOXIDE WITH INCANDESCENCE. PYROPHORIC CHROMIUM UNITES WITH NITRIC OXIDE WITH INCANDESCENCE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-66] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

/Chromium/ contact with /bromine pentaflouride (BrF5)/ at ambient or slightly elevated temp is violent, /with/ ignition often occuring. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 93] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers (such as hydrogen peroxide), alkalis. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

Chromium aerosols ... caused ... irritation to the upper respiratory tract. [Waldbott GL; Health Effects of Envir Poll p.201 (1973)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Chromium causes severe nasal irritation ... . [Arena, J.M. and Drew, R.H. (eds.) Poisoning-Toxicology, Symptoms, Treatments. 5th ed. Springfield, IL: Charles C. Thomas Publisher, 1986., p. 873] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Gloves or rubber coats protect against chrome ulceration of the skin. [Nat'l Research Council Canada; Effects of Chromium in the Canadian Envir p.115 (1976) NRCC No.15017] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch min), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with solids or liquids containing insol chromium salts. ... Employees should be provided with and required to use dust and splashproof safety goggles where solids or liquids containing insol chromium salts may contact the eyes. /Chromium metal and insol chromium salts/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 2.5 mg/cu m. Respirator Class(es): Any dust and mist respirator. May require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 5 mg/cu m. Respirator Class(es): Any dust and mist respirator except single-use and quarter-mask respirators. May require eye protection. Any supplied-air respirator. May require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 12.5 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. May require eye protection. Any powered, air-purifying respirator with a dust and mist filter. May require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 25 mg/cu m. Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter. May require eye protection. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 250 mg/cu m. Respirator Class(es): Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator that has a full face piece and is operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 72] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Daily washing of the inside of the nose combined with covering the nasal septum with zinc or barium ointment should be sufficient to avoid ulcerations and perforation of the septum. [Friberg, L., Nordberg, G.F., Kessler, E. and Vouk, V.B. (eds). Handbook of the Toxicology of Metals. 2nd ed. Vols I, II.: Amsterdam: Elsevier Science Publishers B.V., 1986. V2 205] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 83] of Documents, GPO, February 1987., p. 83] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. ... In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training /sessions/, maintenance, inspection, cleaning, and evaluation /of the equipment/. /Chromium metal and insoluble chromium salts/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Control methods which may be effective include local exhaust ventilation, general dilution ventilation, & personal protective equipment. /Chromium metal and insol chromium salts/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3

VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed. /Chromium metal and insoluble chromium salts/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Promptly remove non-impervious clothing that becomes contaminated. /Chromium metal and insoluble salts (as Cr)/ [NIOSH. Pocket Guide to Chemical Hazards. 5th Printing/Revision. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services,, p. 83] NIOSH/Supt. of Documents, GPO, Sept. 1985., p. 83] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Eating and smoking should not be permitted in areas where solids or liquids containing insoluble chromium salts are handled, processed, or stored. /Chromium metal and insoluble chromium salts/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

STABILITY/SHELF LIFE

NOT OXIDIZED BY AIR, EVEN IN PRESENCE OF MUCH MOISTURE [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 317] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS — NO DATA

STORAGE CONDITIONS — NO DATA

CLEANUP METHODS

COLLECT SPILLED MATERIAL IN THE MOST CONVENIENT & SAFE MANNER & DEPOSIT IN SEALED CONTAINERS FOR RECLAMATION OR FOR DISPOSAL IN A SECURED SANITARY LANDFILL. LIQ CONTAINING CHROMIUM METAL OR INSOL CHROMIUM SALTS SHOULD BE ABSORBED IN VERMICULITE, DRY SAND, EARTH, OR SIMILAR MATERIAL. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

CLEANUP METHODS

WHERE POSSIBLE, WET METHODS OF CLEANING SHOULD BE USED; AT OTHER SITES, THE ONLY ACCEPTABLE ALTERNATIVE IS BY VACUUM

CLEANING. SPILLS OF LIQ OR SOLID MUST BE REMOVED IMMEDIATELY TO PREVENT DISPERSION AS AIRBORNE DUST. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 472] **PEER REVIEWED**

CLEANUP METHODS

If chromium metal or insoluble chromium salts are spilled, the following steps should be taken: 1. Remove all ignition sources where metallic chromium has been spilled. 2. Ventilate area of spill. 3) 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. Liquid containing chromium metal or insoluble chromium salts should be absorbed in vermiculite, dry sand, earth, or a similar material. /Chromium metal and insoluble chromium salts/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Precipitation is the preferred treatment process for removing toxic heavy metals from electroplating waters. Precipitation processes include hydroxide, lime and/or sulfide treatment. Chemical reduction is used to treat complex metals such as nickel, copper, hexavalent chromium waste, soluble lead, silver, metal containing cyanide, and mercury. Adsorption has shown potential for treating and polishing aqueous metal bearing wastes. Activated carbon, activated alumina, and iron filings are all applicable adsorbents. Alkaline chlorination and incineration are effective cyanide destruction treatments. Evaporation, ion-exchange, reverse osmosis, electrodialysis, and electrolytic recovery are waste reduction and recovery techniques applicable to metal bearing hazardous streams. [Grosse DW; 12th Annual Research Symposium on Land Disposal, Remedial Action, Incineration, and Treatment of Hazardous Wastes (1986)] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL — NO DATA

1 - HSDB

NAME OF SUBSTANCE CHRYSENE

CAS REGISTRY NUMBER 218-01-9

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or explosion: Flammable/combustible material. May be ignited by friction, heat, sparks or flames. Some may burn rapidly with flare burning effect. Powders, dusts, shavings, borings, turnings or cuttings may explode or burn with explosive violence. Substance may be transported in a molten form. May re-ignite after fire is extinguished. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Fire may produce irritating and/or toxic gases. Contact may cause burns to skin and eyes. Contact with molten substance may cause severe burns to skin and eyes. Runoff from fire control may cause pollution. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 10 to 25 meters (30 to 80 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protection clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs

Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 100 meters (330 feet). Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2, sand, earth, water spray or regular foam. Large fires: Water spray, fog or regular foam. Move containers from fire area if you can do it without risk. Fire involving tanks or car/trailer loads: Cool containers with flooding quantities of water until well after fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Small dry spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area. Large spills: Wet down with water and dike for later disposal. Prevent entry into waterways, sewers, basements or confined areas. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate

contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Removal of solidified molten material from skin requires medical assistance. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Naphthalene, crude, molten or refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent ... Safety pipettes ... for all pipetting. ... In animal laboratory ... protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators ... when working with particulates or gases, & disposable plastic aprons ... gowns ... /should be/ of distinctive color ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should

be implemented before the decontaminated protective clothing is returned for reuse by the workers. [SRP] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the

Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of admin volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of

carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres for chem such as nitrosamines. Methods ... should ... where possible, be simple & sensitive. ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A.

1 - HSDB
NAME OF SUBSTANCE 2,4-D
CAS REGISTRY NUMBER 94-75-7
HAZARDS SUMMARY NO DATA
DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of

Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading . Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

FIRE POTENTIAL

Material itself does not burn or burns with difficulty. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 245] Hazardous Materials Systems (BOE), 1987., p. 245] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT

THE ACID AND SALTS ARE NONFLAMMABLE. HOWEVER, COMMERCIAL FORMULATIONS OF /2,4-D FREE/ ACID MAY HAVE FLASH POINT MINIMUM OF 88 DEG C (CLEVELAND OPEN CUP) ... /SRP: INERT COMPONENTS OF FORMULATION/ [Weed Science Society of America. Herbicide Handbook. 5th ed. Champaign, Illinois: Weed Science Society of America, 1983., p. 132] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

Extinguishant: Carbon dioxide, dry chemical, foam, and water. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguish fire using agent suitable for type of surrounding fire. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 245] Hazardous Materials Systems (BOE), 1987., p. 245] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Toxic gases and vapors (such as hydrogen chloride and carbon monoxide) may be released in a fire involving 2,4-D. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.).

NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Toxic and irritating ... phosgene gas may form. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

Contact with strong oxidizers may cause fires or explosions. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

DECOMPOSITION

When heated to decomposition it emits toxic fumes of /hydrogen chloride/. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 957] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

Detection: 3.13 mg/kg /SRP: Technical grade/ [Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983., p. 496] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Dust may irritate eyes. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Acute eye or skin irritation ... has been reported in agricultural and forestry workers following occupational exposure. [WHO; Environ Health Criteria: 2,4-Dichlorophenoxyacetic Acid (2,4-D) p.95 (1984)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health. ... Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate

protective clothing necessary to prevent repeated or prolonged skin contact with 2,4-D or liquids containing 2,4-D. ... Employees should be provided with and required to use dust- and splash-proof safety goggles where 2,4-D or liquids containing 2,4-D may contact the eyes. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 100 mg/cu m: Respirator Classes: Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. Any supplied-air respirator. Any self-contained breathing apparatus with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Emergency or planned entry into unknown concn or IDLH conditions: Condition: Respirator Classes: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Escape from suddenly occurring respiratory hazards: Condition: Respirator Classes: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... Gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Handle carefully. Do not contaminate water, food or feed by product storage or disposal. ... Do not use spray equipment contaminated with this product for any other purposes unless thoroughly cleaned with a suitable cleaner. ... Do not apply where irrigation water may be contaminated. [Farm Chemicals Handbook 1992. Willoughby, OH: Meister Publishing Co., 1992. C-101] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. ... If employees' clothing ... becomes contaminated with 2,4-D, employees should change into uncontaminated clothing before leaving the work premises. Clothing contaminated with 2,4-D should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of 2,4-D from the clothing. If the clothing is to be laundered or otherwise cleaned to remove 2,4-D, the person performing the operation should be informed of 2,4-D's hazardous properties. Non-impervious clothing which becomes contaminated with 2,4-D should be removed promptly and not reworn until the 2,4-D is removed from the clothing. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Eating and smoking should not be permitted in areas where solid 2,4-D is handled, processed, or stored. Employees who handle 2,4-D or liquids containing 2,4-D should wash their hands thoroughly with soap or mild detergent before eating, smoking, or using toilet facilities. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational

Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

/Individuals/ not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation /of equipment/. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 80] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

If material /is/ not involved in fire: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Keep upwind. ... Avoid breathing vapors or dusts. Wash away any material which may have contacted the body with copious amounts of water or soap and water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 245] Hazardous Materials Systems (BOE), 1987., p. 245] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Smoking, eating, and drinking before washing should be absolutely prohibited when any pesticide ... is being handled or used. /Pesticides/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1619] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

/When/ cleaning glassware and spray equipment: wash thoroughly with water and detergent soln. Alcohol or ketone type solvents may be used with ester formulations. Preferably, equipment should not be used for application of other pesticides or fertilizers. [Weed Science Society of America. Herbicide Handbook. 5th ed. Champaign, Illinois: Weed Science Society of America, 1983., p. 132] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... Clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/

[Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... Unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the

exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing & use of

dry dusters or mops should be prohibited. Grossly contaminated cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 11] **PEER REVIEWED**

STABILITY/SHELF LIFE

Stable under normal conditions of storage. [Spencer, E. Y. Guide to the Chemicals Used in Crop Protection. 7th ed. Publication 1093. Research Institute, Agriculture Canada, Ottawa, Canada: Information Canada, 1982., p. 154] **PEER REVIEWED**

STABILITY/SHELF LIFE

Stable up to 50 deg C for at least 2 yr. [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. Old Woking, Surrey, United Kingdom: Royal Society of Chemistry/Unwin Brothers Ltd., 1983. A111/Oct 83] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 197] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed

recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3097-1,6193,6194,6195 (1988)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

STORAGE CONDITIONS

DO NOT STORE NEAR OTHER AGROCHEMICALS OR SEEDS. [Farm Chemicals Handbook 1992. Willoughby, OH: Meister Publishing Co., 1992. C-101] **PEER REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **PEER REVIEWED**

CLEANUP METHODS

1) Ventilate area of spill. 2) For small quantities, sweep onto paper or other suitable material, place in an appropriate container and burn in a safe place (such as a fume hood). Large quantities may be reclaimed. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

CLEANUP METHODS

Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid, or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 245] Hazardous Materials Systems (BOE), 1987., p. 245] **PEER REVIEWED**

CLEANUP METHODS

Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the amount spilled. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 245] Hazardous Materials Systems (BOE), 1987., p. 245] **PEER REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal ... The plastic bag should be sealed immediately ... The sealed bag should be labelled properly ...

Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste numbers D016 and U240, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/91)] **PEER REVIEWED**

DISPOSAL METHODS

Landfill: 2,4-Dichlorophenoxyacetic acid is considered to be nonpersistent, although it may last more than one year in dry areas. Studies at 116 kg/ha have shown it is degraded by spreading on the land. Since the ester forms are somewhat volatile, they should probably be hydrolyzed first to avoid drift, if this method of disposal is used. Incineration of phenoxys is effective in one second at 980 deg C using a straight combustion process or at 480 deg C using catalytic combustion. Over 99% decomposition was reported when small amounts of 2,4-D were burned in a polyethylene bag. Chlorination at pH 3 and 29 deg C for 10 min (using an excess of either gaseous chlorine or a sodium hypochlorite soln) renders the phenoxys nonherbicidal, but the products were unstated and are possibly objectionable. Reduction of 2,4-D by sodium or lithium in liquid ammonia has been reported as has oxidation with boric oxide in a Parr bomb, but neither method is suitable as a general disposal technique. Addition of soluble calcium (or magnesium) salts to soln of 2,4-D acid or salts (but not the ester forms) produces the insoluble (solid) calcium 2,4-D salt. This reaction can aid in collecting the 2,4-D but the product is still herbicidally active. Degradation of 2,4-D is achieved in biological treatment facilities. Recommendable method: Incineration. Not recommendable method: Discharge to sewer. Peer-review: Incinerate at high temp or PCDDs may be formed. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 70] **PEER REVIEWED**

DISPOSAL METHODS

Incineration and landfill: 2,4-D /2,4-dichlorophenoxyacetic acid/ is known to be readily detoxified by soil microorganisms and at low dosages is normally decomposed in one to four weeks. The detection of 2,4-dichlorophenol, 4-chlorocatechol, chloromuconic and succinic acids from either soil or pure

culture studies suggests a sequence of reactions involving ring hydroxylation and cleavage and further metabolism of the open chain structure to carbon dioxide. The non-persistence and detoxification of 2,4-D in soil indicate that burial in non-crop areas away from water supplies would be an acceptable method for the disposal of small quantities of 2,4-D. Incineration at high temperatures with sufficient residence time leads to complete detoxification of 2,4-D and is the most environmentally acceptable method for 2,4-D disposal. For the decontamination of 2,4-D containers-drums: triple rinse and drain procedure ("triple rinse" means the flushing of containers three times of the normal diluent equal to approximately 10% of the container's capacity and adding the rinse liquid to the spray mixture or disposing of it by the method prescribed for disposing of the pesticide). Small containers should be punched full of holes, crushed and taken to a landfill. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 71] **PEER REVIEWED**

DISPOSAL METHODS

Chemical treatment: Detoxification requires treatment with chloride of lime or sodium carbonate. Rinse containers with a 5% soln of caustic soda. Farms are allowed to destroy if necessary up to 10 kg of the pesticide. Removal of 17% of 2,4-D /(2,4-dichlorophenoxy)acetic acid/ from water is achieved by coagulation and complete water treatment by ozonation; the use of activated charcoal is an effective treatment technique. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 71] **PEER REVIEWED**

DISPOSAL METHODS

Herbicide orange /was incinerated/ by the use of two identical refractory lined furnaces on board the Mt Vulcanus while at sea. The average wall temperature was 1273 deg C and average flame was 1500 deg C. A residence time of 1.0 second was used. Combustion efficiency was > 99.98%. Destruction efficiency was: 2,4-D > 99.9%; 2,4,5-T > 99.9%; Total hydrocarbon 99.982 to 99.992%; Herbicide orange > 99.999%; 2,3,7,8-tetrachlorodibenzo-p-dioxin > 99.93 to > 99.99%; Chlorinated hydrocarbons > 99.999%. /From table/ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-3 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

A potential candidate for rotary kiln incineration at a temperature range of 820 to 1,600 deg C and residence times of seconds for liquids and gases, and hours for solids. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-8 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technology have been investigated for 2,4-D and related herbicides: Concentration process: Resin adsorption. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-195 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 14] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 14] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known ... but 1-2 days is generally considered sufficient when

freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB
NAME OF SUBSTANCE DDD
CAS REGISTRY NUMBER 72-54-8
HAZARDS SUMMARY

The major hazards encountered in the use and handling of DDD stem from its toxicologic properties as an organochlorine pesticide. Toxic effects may be exerted from all routes of exposure (ie, ingestion, inhalation, or dermal contact) and range from irritation of the skin, eyes, nose and throat, and liver damage, to possibly death in extreme exposure cases (estimated fatal oral dose for humans: 5 g/kg of body weight). These effects may be protected against by the wearing of rubber gloves, goggles or face shield or a self-contained breathing apparatus. Protect from exposure, individuals with liver disease. In cases where contact with the odorless, colorless dust of DDD is unavoidable, contaminated clothing and shoes should be removed and the affected areas of the body flushed with water. DDD will not ignite easily, but it will burn with the potential to emit irritating or poisonous gases. For small fires involving DDD, extinguish with dry chemical, CO2, water spray, or foam, and for large fires, use water spray, fog, or foam. Runoff from fire control water may give off poisonous gases or cause water pollution and should, therefore, be diked for later disposal. DDD should be stored at ambient temperature in containers that bear the label, "Keep Away From Food". All modes of transport are acceptable for DDD (ie, air, road, rail, and water). Small spills of DDD should be carefully shovelled into a container (liquid DDD is first absorbed by a non-combustible material, like sand) for later disposal. Large land spills are diked or deposited in excavated pits, ponds, or other holding areas (dry spills are covered with plastic sheeting) for later disposal. Large spills on water first may need to be trapped at the bottom with sand bag barriers or treated by an application of activated charcoal, then removed by suction hose or mechanical dredge. Before permanent land disposal of DDD, consult with environmental regulatory agencies. In addition to land disposal, DDD is a potential candidate for incineration by rotary kiln. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Toxic; may be fatal if inhaled, ingested or absorbed through skin. Inhalation or contact with some of these materials will irritate or burn skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Highly flammable: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion and poison hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: Call Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing is recommended for fire situations only; it is not effective in spill situations. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research

and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "Public safety". Fire: If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: CAUTION: All these products have a very low flash point. Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Large fires: Water spray, fog or alcohol-resistant 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled

material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Small spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous

Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and

Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and

Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

FIRE POTENTIAL

Combustible [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA

FIRE FIGHTING PROCEDURES

Fire extinguishing agents: water, foam, dry chemical, or carbon dioxide. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Irritating hydrogen chloride fumes may form in fires. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

When heated to decomposition it emits toxic fumes of chlorides. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 465] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION

WHEN HEATED TO DECOMP, EMITS HIGHLY TOXIC FUMES OF /HYDROGEN CHLORIDE/. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 465] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

SLIGHTLY IRRITATING TO SKIN. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 444] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Irritating to ... nose and throat. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear goggles, or face shield, dust mask, rubber gloves, or self contained breathing apparatus. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Stop discharge if possible. Keep people away. Avoid contact with solid and dust. Isolate and remove dischaged material. Notify local health and pollution control agencies. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Remove contaminated clothing and shoes. Flush affected areas /of body/ with plenty of water. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for

Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della

Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing & use of dry dusters or mops should be prohibited. Grossly contaminated cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 11] **PEER REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 189] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6193-5 (1988)] **QC REVIEWED**

STORAGE CONDITIONS

Storage temperature: ambient [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **PEER REVIEWED**

CLEANUP METHODS

For land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Cover solids with

a plastic sheet to prevent dissolving in rain or fire fighting water. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.490 (1981)] **PEER REVIEWED**

CLEANUP METHODS

For water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. If 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. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.491 (1981)] **PEER REVIEWED**

CLEANUP METHODS

The applicability of carbon to remove toxicants on EPA's published list and fish kill due to influent and effluent from five industrial plants currently using adsorption as a treatment method are examined. In the laboratory, activated carbon can achieve levels of less than 1 mg/l of aldrin, dieldrin, endrin, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethene, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, toxaphene, and Aroclor 1254. In operating plants, the toxicity of wastes to fish due to unknown constituents is significantly reduced or totally removed by activated carbon treatment. [Bernardin FE, Froelich EM; Purdue Univ 30th Ind Waste Conf, May 6-8 p.548 (1975)] **PEER REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal ... The plastic bag should be sealed immediately ... The sealed bag should be labelled properly ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U060, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/89)] **PEER REVIEWED**

DISPOSAL METHODS

DDD is a potential candidate for incineration by rotary kiln with a temperature range of 820-1600 deg C and a residence time of seconds for liquid or gas and hours for solid. /SRP: Control acid mist from exhaust gases./ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-12 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165 (7/1/88)] **PEER REVIEWED**

DISPOSAL METHODS

Group II Containers: Noncombustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to a scrap metal facility for recycling, disposal, or burial in a designated landfill. /Organic or metallo-organic pesticides/ [40 CFR 165 (7/1/88)] **PEER REVIEWED**

DISPOSAL METHODS

DDE may be disposed of by combustion in a unit operating @ 85 deg C equipped with off gas scrubbing equipment to absorb hydrogen chloride. Incineration @ temp above 1200 deg C for 1-2 sec is recommended. Recommendable method: Incineration. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 170] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 14] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 14] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a

second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known ... but 1-2 days is generally considered sufficient when freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete

reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE DDE

CAS REGISTRY NUMBER 72-55-9

HAZARDS SUMMARY

The major hazards encountered in the use and handling of DDE stem from its toxicologic properties as an organochlorine pesticide. DDE may cause liver and kidney damage, and, by analogy to DDT, it may also prove fatal by ingestion, inhalation, or skin absorption. Precautions against these potential effects include the wearing of protective clothing and gloves, and the use of dust or gas masks, or combined respirators. Protect from exposure, persons with liver disease. DDE will not ignite easily, but it will burn with the potential to emit irritating or poisonous gases. For small fires involving DDE, extinguish with dry chemical, CO2, water spray, or foam, and for large fires, use water spray, fog, or foam. Runoff from fire control water may give off poisonous gases or cause water pollution and should, therefore, be diked for later disposal. Small spills of DDE should be carefully shovelled into a clean, dry container for later disposal, (liquid DDE is first absorbed by a non-combustible material, eg, sand) for later disposal. Before permanent land disposal of DDE, consult with environmental regulatory agencies. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Toxic; may be fatal if inhaled, ingested or absorbed through skin. Inhalation or contact with some of these materials will irritate or burn skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Highly flammable: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion and poison hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American

Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: Call Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing is recommended for fire situations only; it is not effective in spill situations. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "Public safety". Fire: If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/

[U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: CAUTION: All these products have a very low flash point. Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Large fires: Water spray, fog or alcohol-resistant 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Small spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods

Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Organochlorine pesticide, liquid, flammable, poisonous; Organochlorine pesticide, liquid, flammable, toxic; Organochlorine pesticide, liquid, poisonous, flammable; Organochlorine pesticide, liquid, toxic, flammable/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151]

Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials

Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation,

ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Organochlorine pesticide, liquid, poisonous; Organochlorine pesticide, liquid, toxic; Organochlorine pesticide, solid, poisonous; Organochlorine pesticide, solid, toxic/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

It is particularly important to protect the skin from contamination through the proper use of protective clothing and gloves. Where indicated respiratory protective equipment or suitable ... /NIOSH approved breathing apparatus/ or combined respirators, should be used. /Pesticides, halogenated/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1636] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della

Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. Contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles &

wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or

biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious

contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing & use of dry dusters or mops should be prohibited. Grossly contaminated cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 11] **PEER REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 189] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed

recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3097-1, 6193, 6194, 6195 (1988)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practicable to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be

carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **PEER REVIEWED**

CLEANUP METHODS

The applicability of carbon to remove toxicants on EPA's published list and fish kill due to influent and effluent from five industrial plants currently using adsorption as a treatment method are examined. In the laboratory, activated carbon can achieve levels of less than 1 mg/l of aldrin, dieldrin, endrin, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethene, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, toxaphene, and Aroclor 1254. In operating plants, the toxicity of wastes to fish due to unknown constituents is significantly reduced or totally removed by activated carbon treatment. [Bernardin FE, Froelich EM; Purdue Univ 30th Ind Waste Conf, May 6-8 p.548 (1975)] **PEER REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms. ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal. ... The plastic bag should be sealed immediately. ... The sealed bag should be labelled properly. ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated. ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165 (7/1/88)] **PEER

REVIEWED**

DISPOSAL METHODS

Group II Containers: Non-combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to a scrap metal facility for recycling, disposal, or burial in a designated landfill. /Organic or metallo-organic pesticides/ [40 CFR 165 (7/1/88)] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known

... but 1-2 days is generally considered sufficient when freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE DDT

CAS REGISTRY NUMBER 50-29-3

HAZARDS SUMMARY

The major hazards encountered in the use and handling of DDT stem from its toxicologic properties as an organochlorine pesticide. While DDT may exert toxic effects from all routes of exposure, acute effects from ingestion are the most dramatic and frequently experienced, ranging from vomiting and diarrhea to coarse tremors, convulsions, and death. Effects from dermal contact (eg, dermatitis) and inhalation (eg, irritation of the nose and throat) have been noted, but are rare. To protect against its toxic effects in areas where there may be detectable amounts of DDT (eg, formulation and application activities) workers should wear protective clothing (including neoprene gloves and apron), and a self-contained or supplied-air respirator with a full facepiece and operated in positive-pressure mode. While OSHA established a PEL of only 1 mg/cu m as an 8 hr TWA in workplace air, it is still recommended that strict adherence to personal hygiene be maintained, including the daily cleaning of protective equipment and clothing, and washing of exposed skin with soap and water before eating and at the end of the work day. DDT will not ignite easily (flashpoint 162-171 deg F closed cup), but it will burn with the potential of giving off irritating or poisonous gases. For small fires involving DDT, extinguish with dry chemical, CO2, water spray, or foam, and for large fires, use water spray, fog, or foam. Runoff from fire control water may give off poisonous gases or cause water pollution and should therefore, be controlled (eg, diked for later disposal). DDT may be stored in bottles, tins, bags, or fiber drums, but not in iron drums. DDT is reactive with iron and aluminum salts, as well as alkaline substances. Shipping containers should bear the label, "Keep Away From Food". Spills of DDT should be quickly contained. Small spills (liquid DDT first absorbed by non-combustible material, eg, sand) are carefully shovelled into a container for later disposal. Large land spills are diked or deposited in excavated pits, ponds, or other holding areas (dry spills are covered with plastic sheet) for later disposal. Large spills on water first may need to be trapped at the bottom with sand bag barriers or treated by an application of activated charcoal, then removed by suction hose or mechanical dredge. Before permanent land disposal of DDT, consult with environmental regulatory agencies. In addition to land disposal, a variety of incineration techniques have been successful in destroying DDT with over a 99% efficiency. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous

Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response

Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved,

and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

FIRE POTENTIAL

Behavior in fire: Melts and burns. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FIRE POTENTIAL

Material itself does not burn or burns with difficulty. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 215] Hazardous Materials Systems (BOE), 1987., p. 215] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT

162-171 deg F (closed cup) [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

Fire extinguishing agents: Water, foam, dry chemical, or carbon dioxide. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguish fire using agent suitable for type of surrounding fire. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 215] Hazardous Materials Systems (BOE), 1987., p. 215] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Poisonous gases are produced in fire. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, alkalis. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

DECOMPOSITION

DECOMP AT 110 DEG C; DEHYDROCHLORINATES IN ALKALI OR ORG BASES WHEN IN ORG SOLVENTS [Sunshine, I. (ed.). CRC Handbook of

Analytical Toxicology. Cleveland: The Chemical Rubber Co., 1969., p. 507] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

Detection threshold in water: 0.35 ppm [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 43] **PEER REVIEWED**

ODOR THRESHOLD

Odor high 5.0725 mg/cu m; odor low 5.0725 mg/cu m. [Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Irritating to skin and eyes. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear safety goggles, gas mask, protective clothing. Neoprene gloves and apron. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 150] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

... Wear appropriate chemical protective gloves, boots and goggles. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 215] Hazardous Materials Systems (BOE), 1987., p. 215] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering, & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... Gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and

is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

... WORKERS EMPLOYED ON FORMULATING & APPLICATION OF DDT SHOULD BE SUBJECT TO PRECAUTIONARY MEASURES ... PROVIDED WITH SUITABLE WORK CLOTHING & ... PROTECTIVE EQUIPMENT. ADEQUATE SANITARY FACILITIES, INCL SHOWERS SHOULD BE PROVIDED, & NEED FOR PERSONAL HYGIENE STRESSED. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II.

Geneva, Switzerland: International Labour Office, 1983., p. 592] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

... A thorough daily cleansing of the clothes and the personal protective equipment should be organized. ... Personal hygiene should include regular hand washing before meals and washing of the body at the end of the working day. /Pesticides, halogenated/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1636] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 93] of Documents, GPO, February 1987., p. 93] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

If material /is/ not involved in fire: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 215] Hazardous Materials Systems (BOE), 1987., p. 215] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Keep upwind. ... Avoid breathing vapors or dusts. Wash away any material which may have contacted the body with copious amounts of water or soap and water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 215] Hazardous Materials Systems (BOE), 1987., p. 215] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. Contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... Clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for

Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used. ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs. ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... Unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della

Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing, & use of dry dusters or mops should be prohibited. Grossly contaminated cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer,

1979., p. 11] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should wash daily at the end of each work shift. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 88] **QC REVIEWED**

STABILITY/SHELF LIFE

RESISTANT TO DESTRUCTION BY LIGHT & OXIDATION [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 410] **PEER REVIEWED**

STABILITY/SHELF LIFE

P,P'-DDT IS DEHYDROCHLORINATED AT TEMP ABOVE ITS MP TO DDE, A REACTION CATALYZED BY IRON(III) OR ALUMINUM CHLORIDES & UV LIGHT &, IN SOLN, BY ALKALI /OR ORGANIC BASES/. ... IT IS GENERALLY STABLE TO OXIDATION ... DEHYDROCHLORINATION MAY OCCUR ABOVE 50 DEG C. [Worthing, C.R. and S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 8th ed. Thornton Heath, UK: The British Crop Protection Council, 1987., p. 231] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 189] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic

principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6193-5 (1988)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

STORAGE CONDITIONS

... SHOULD NOT BE KEPT IN IRON CONTAINERS & SHOULD NOT BE MIXED WITH IRON & ALUMINUM SALTS NOR WITH ALKALINE SUBSTANCES. HIGH STORAGE TEMP SHOULD BE AVOIDED. [The Merck Index. 10th ed.

Rahway, New Jersey: Merck Co., Inc., 1983., p. 410] **PEER REVIEWED**

STORAGE CONDITIONS

CONTAINERS: BOTTLES; TINS; BAGS; FIBER DRUMS. [Hawley, G.G. The Condensed Chemical Dictionary. 10th ed. New York: Van Nostrand Reinhold Co., 1981., p. 306] **PEER REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practicable to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **PEER REVIEWED**

CLEANUP METHODS

Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with a impermeable flexible membrane liner./ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 215] Hazardous Materials Systems (BOE), 1987., p. 215] **PEER REVIEWED**

CLEANUP METHODS

Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. If 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. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 215] Hazardous Materials Systems (BOE), 1987., p. 215] **PEER REVIEWED**

CLEANUP METHODS

The applicability of carbon to remove toxicants on EPA's published list and fish kill due to influent and effluent from five industrial plants currently using adsorption as a treatment method are examined. In the laboratory, activated carbon can achieve levels of less than 1 mg/l of aldrin, dieldrin, endrin, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethene, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, toxaphene, and aroclor 1254. In operating plants, the toxicity of wastes to fish due to unknown constituents is significantly reduced or totally removed by activated carbon treatment. [Bernardin FE, Froelich EM; Purdue Univ 30th Ind Waste Conf, May 6-8 p.548

(1975)] **PEER REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms. ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal. ... The plastic bag should be sealed immediately. ... The sealed bag should be labelled properly. ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated. ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U061, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/89)] **PEER REVIEWED**

DISPOSAL METHODS

DDT is a potential candidate for incineration by rotary kiln with a temperature range of 820 to 1600 deg C and residence time of seconds for liquids and gases, and hours for solids. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-12 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165 (7/1/88)] **PEER REVIEWED**

DISPOSAL METHODS

Group II Containers: Non-combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to a scrap metal facility for recycling, disposal, or burial in a designated landfill. /Organic or metallo-organic pesticides/

[40 CFR 165 (7/1/88)] **PEER REVIEWED**

DISPOSAL METHODS

DDT /formulated in a/ 5% oil solution was disposed of by using liquid injection incineration with a temperature range of 878-1260 deg C along with a residence time of 0.16-1.30 seconds and 26-70% excess air. Destruction efficiency was > 99.99%. /From table/ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-2 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

DDT (DDT powder, 75% active ingredients) was disposed of by using a municipal multiple hearth sludge incinerator during four trial runs. Trial 1, the temperature range was 597-1225 deg C (no residence time specified) with 6.5-10% excess air, destruction efficiency was 99.970%. Trial 2, the temperature range was 644-1325 deg C (no residence time specified) with 6.5-10% excess air, destruction efficiency was 99.975%. Trial 3, the temperature range was 544-1160 deg C (with no residence time specified) with 6.5-10% excess air, the destruction efficiency was 99.977%. Trial 4, the temperature range was 788-1550 deg C (with no residence time specified) with 6.5-10% excess air, the destruction efficiency was 99.983%. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-2 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

DDT (10% DDT dust, 90% inert ingredients) was disposed of in a multiple chamber incinerator with a temperature range of 930-1210 deg C along with a residence time of 1.2-2.5 seconds and 58-164% excess air. Destruction efficiency of DDT > 99.99%. Total species destruction was > 99.98%. /From table/ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-2 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

DDT (20% DDT, 80% aromatic petroleum derivative solvent) was disposed of by using a liquid injection incinerator with a temperature range of 943-1093 deg C along with a residence time of 0.139-0.593 seconds and 42-47% excess air. Destruction efficiency was > 99.98%. /From table/ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-2 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

DDT (25% emulsifiable concentrate, 72% aromatic petroleum derivative, and 3% inert ingredients) was disposed of by using a liquid injection incinerator with a temperature of 865-1082 deg C along with a residence time of 0.136-0.727 seconds and 42-65% excess air. Destruction efficiency was > 99.9%. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-2 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

DDT (25% emulsifiable concentrate, 18% petroleum oil, 55% xylene, 2% inert ingredients) was disposed of in a multiple chamber incinerator with a temperature range of 930-1180 deg C along with a residence time of 0.7-3.2 seconds and 64-166% excess air. Destruction efficiency was > 99.98- > 99.99%. /From table/ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-2 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **PEER REVIEWED**

DISPOSAL METHODS

Chemical treatment: DDT is chemically and biologically quite stable and its degradation poses a serious challenge. Specific methods which have been studied are the following: 1) Reaction with base - At the time of its discovery in 1874 DDT was reported to undergo a dehydrochlorination reaction in strongly basic soln, that is, caustic alkali in alcohol, to give a product now known as DDE: C14H9Cl5 --- base alcohol ---> C14H8Cl4 + HCl base. In the late 1940s the dehydrochlorination was shown to be complete in 30-60 min @ room temp in 0.1 N alkali soln and to occur also with organic bases such as amines. The dehydrochlorination reaction (frequently referred to incorrectly as a hydrolysis) continues to be mentioned as a degradation method, but it is not suitable as a disposal method: Although the DDE is insecticidally nearly inert, it is persistent in the environment and is suspected of being biomagnified and causing undesirable effects in fish and fowl. 2) Oxidation - DDT is quite resistant to oxidation and is not oxidized by chromic oxide in glacial acetic acid or by nitric acid, although the latter nitrates the aromatic rings. 3) Reduction - The reduction of DDT by active metals has been known for several years, but does not constitute a practical disposal method. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 173] **PEER REVIEWED**

DISPOSAL METHODS

Dissolve in a combustible solvent. Scatter the spray of the soln into a furnace with afterburner and alkali scrubber. Recommendable method: Incineration. (Peer-review: Incinerate @ high temp. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 174] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for DDT: Biological Treatment. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-3-E-22 (1982)] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL — NO DATA

1 - HSDB

NAME OF SUBSTANCE DIBENZ(A,H)ANTHRACENE

CAS REGISTRY NUMBER 53-70-3

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or explosion: Flammable/combustible material. May be ignited by friction, heat, sparks or flames. Some may burn rapidly with flare burning effect. Powders, dusts, shavings, borings, turnings or cuttings may explode or burn with explosive violence. Substance may be transported in a molten form. May re-ignite after fire is extinguished. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Fire may produce irritating and/or toxic gases. Contact may cause burns to skin and eyes. Contact with molten substance may cause severe burns to skin and eyes. Runoff from fire control may cause pollution. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 10 to 25 meters (30 to 80 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protection clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods

Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 100 meters (330 feet). Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2, sand, earth, water spray or regular foam. Large fires: Water spray, fog or regular foam. Move containers from fire area if you can do it without risk. Fire involving tanks or car/trailer loads: Cool containers with flooding quantities of water until well after fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Small dry spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area. Large spills: Wet down with water and dike for later disposal. Prevent entry into waterways, sewers, basements or confined areas. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing.

Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Removal of solidified molten material from skin requires medical assistance. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA

DECOMPOSITION

When heated to decomposition it emits acrid smoke & irritating fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 901] **PEER REVIEWED**

POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent ... Safety pipettes ... for all pipetting. ... In animal laboratory ... protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators ... when working with particulates or gases, & disposable plastic aprons, ... gowns ... /should be/ of distinctive color. ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8]

PEER REVIEWED

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... Clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air

1 - HSDB

NAME OF SUBSTANCE	DIBENZOFURAN
CAS REGISTRY NUMBER	132-64-9
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA

ODOR THRESHOLD

Odor low= 0.7752 mg/cu m; odor high= 1.6150 mg/cu m [Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)] **PEER REVIEWED**

ODOR THRESHOLD

Odor detection in air= 1.2x10-1 ppm, purity= chemically pure. [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 48] **PEER REVIEWED**

ODOR THRESHOLD

Odor detection in air= 2.5x10-1 ppm, purity= chemically pure. [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 48] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA
PROTECTIVE EQUIPMENT & CLOTHING	NO DATA
OTHER PREVENTIVE MEASURES	NO DATA
STABILITY/SHELF LIFE	NO DATA
SHIPMENT METHODS AND REGULATIONS	NO DATA
STORAGE CONDITIONS	NO DATA
CLEANUP METHODS	NO DATA

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL	NO DATA

1 - HSDB

NAME OF SUBSTANCE 1,2-DIBROMO-3-CHLOROPROPANE

CAS REGISTRY NUMBER 96-12-8

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: Inhalation of vapors or dust is extremely irritating. May cause burning of eyes and flow of tears. May cause coughing, difficult breathing and nausea. Brief exposure effects last only a few minutes. Exposure in an enclosed area may be very harmful. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Some of these materials may burn, but none ignite readily. Containers may explode when heated. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials

Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 100 meters (330 feet). Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2, water spray or regular foam. Large fires: Water spray, fog or regular 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. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch or walk through spilled material. Stop leak if you can do it without risk. Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Small spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: Dike far ahead of liquid spill for later disposal. Prevent entry into waterways, sewers, basements or confined areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled

the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects should disappear after individual has been exposed to fresh air for approximately 10 minutes. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-159] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-159] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-159] **QC REVIEWED**

FIRE POTENTIAL

1,2-Dibromo-3-chloropropane (DBCP) itself is classified in the USA as a combustible liq in class IIIA; formulations of DBCP incl kerosene or other flammable solvents fall into the flammable range (class IB for formulations made with kerosene). [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 622] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION: NO DATA

FLAMMABLE LIMITS: NO DATA

FLASH POINT

170 DEG F (OPEN CUP) [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1982] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE: NO DATA

FIRE FIGHTING PROCEDURES: NO DATA

TOXIC COMBUSTION PRODUCTS: NO DATA

OTHER FIRE FIGHTING HAZARDS: NO DATA

EXPLOSIVE LIMITS AND POTENTIAL: NO DATA

REACTIVITIES & INCOMPATIBILITIES

Chemically-active metals such as aluminum, magnesium & tin alloys [Note: Corrosive to metals]. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 92] **PEER REVIEWED**

DECOMPOSITION

195.5 deg C at 760 mm Hg, with decomp [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 621] **PEER REVIEWED**

POLYMERIZATION: NO DATA

OTHER HAZARDOUS REACTIONS: NO DATA

ODOR THRESHOLD

Low odor threshold= 0.0965 mg/cu m; High odor threshold= 0.2895

mg/cu m; Irritating concn= 1.93 mg/cu m [Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

MAY BE IRRITATING TO SKIN, MUCOUS MEMBRANES. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 438] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Protective clothing shall be resistant to the penetration & to the chemical action of dibromochloropropane. Additional protection, incl gloves, bib-type aprons, boots & overshoes, shall be provided for, & worn by, each employee during any operation that may cause direct contact with liq. ... [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 309] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Unless eye protection is afforded by a respirator hood or facepeice, protective goggles (splash-proof safety goggles (cup-cover type dust & splash safety goggles)) ... or a face shield (8-in minimum) shall be worn at operations where there is danger of contact of the eyes with liquid dibromochloropropane because of spills or splashes. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 308] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles and wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Vendor recommendations concerning the protective qualities of materials to minimize potential exposure to 1,2-dibromo-3-chloropropane are as follows: Nitrile and polyvinyl chloride received fair or poor ratings from three or more vendors; Polyethylene and chlorinated polyethylene received fair or poor ratings from less than three vendors. [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.78 (1983)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS

(NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 92] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 92] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 92] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 92] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL,

1 - HSDB
NAME OF SUBSTANCE DIBUTYL PHTHALATE
CAS REGISTRY NUMBER 84-74-2
HAZARDS SUMMARY

The major hazards encountered in the use and handling of dibutyl phthalate stem from its toxicologic properties. Toxic by all routes (ie, inhalation, ingestion, dermal contact), exposure to this colorless-to-yellow, oily liquid may occur from its use as a plasticizer or solvent in lacquers, elastomers, chlorinated rubbers, polyvinyl acetate, explosives, nail polish, perfumes, resins, printing inks, paper coatings, and adhesives. Effects from exposure may include contact burns to the skin and eyes, dermatitis, nausea, and dizziness. Both the OSHA PEL and the ACGIH TLV have been set at 5 mg/cu m. Odor thresholds have been found as low as 0.26 mg/cu m. Ventilation should be used to maintain acceptable levels. In activities where over-exposure may occur, wear a self-contained breathing apparatus and protective clothing. If contact should occur, immediately flush affected skin and eyes with running water for at least 15 minutes. While dibutyl phthalate does not ignite

1 - HSDB
NAME OF SUBSTANCE DIBUTYL PHTHALATE
CAS REGISTRY NUMBER 84-74-2
HAZARDS SUMMARY

The major hazards encountered in the use and handling of dibutyl phthalate stem from its toxicologic properties. Toxic by all routes (ie, inhalation, ingestion, dermal contact), exposure to this colorless-to-yellow, oily liquid may occur from its use as a plasticizer or solvent in lacquers, elastomers, chlorinated rubbers, polyvinyl acetate, explosives, nail polish, perfumes, resins, printing inks, paper coatings, and adhesives. Effects from exposure may include contact burns to the skin and eyes, dermatitis, nausea, and dizziness. Both the OSHA PEL and the ACGIH TLV have been set at 5 mg/cu m. Odor thresholds have been found as low as 0.26 mg/cu m. Ventilation should be used to maintain acceptable levels. In activities where over-exposure may occur, wear a self-contained breathing apparatus and protective clothing. If contact should occur, immediately flush affected skin and eyes with running water for at least 15 minutes. While dibutyl phthalate does not ignite easily, it may burn with the production of irritating or poisonous gases. Fires involving dibutyl phthalate may be extinguished with dry chemical, CO_2, or Halon. Standard foam or water fog, if used, should be applied with caution, as each may cause violent frothing. Dibutyl phthalate may be shipped via air, rail, road, and water. If small amounts of dibutyl phthalate should spill, take up with sand or other noncombustible absorbent and place into containers for later disposal. For large spills, first dike far ahead of the area with soil, sand bags, foamed polyurethane, or foamed concrete, then absorb bulk material with fly ash or cement powder. For large spills in bodies of water, first use natural barriers or oil spill control booms to limit spill motion, then apply detergent, soap, or alcohols to thicken material. Apply "universal" gelling agent and remove trapped material with suction hoses. If dissolved, apply activated charcoal, and use

mechanical dredges or lifts to remove immobilized masses. Before implementing land disposal of waste dibutyl phthalate, consult with environmental regulatory agencies for guidance. Also, dibutyl phthalate is a good candidate for liquid injection, rotary kiln, and fluidized bed forms of incineration. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Some may burn but none ignite readily. Some may polymerize (P) explosively when heated or involved in a fire. Containers may explode when heated. Some may be transported hot. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Inhalation of material may be harmful. Contact may cause burns to skin and eyes. Inhalation of asbestos dust may have a damaging effect on the lungs. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 10 to 25 meters (30 to 80 feet) in all directions. Keep unauthorized personnel away. Stay upwind. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2, water spray or regular foam. Large fires: Water spray, fog or regular foam. Move containers from fire area if you can do it without risk. Do not scatter spilled material with high pressure water streams. Dike fire-control water for later disposal. Fire involving tanks: Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent dust cloud. Avoid inhalation of asbestos dust. Small dry spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area. Small spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: Dike far ahead of liquid spill for later disposal. Cover powder spill with plastic sheet or tarp to minimize spreading. Prevent entry into waterways, sewers, basements or confined areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996

North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-171] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-171] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-171] **QC REVIEWED**

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION

Health: 0. 0= Materials which on exposure under fire conditions would offer no health hazard beyond that of ordinary combustible material. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-33] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. ... water fog gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-33] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which are normally stable even under fire exposure conditions, and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-33] **PEER REVIEWED**

FLAMMABLE LIMITS

LOWER: 0.5% BY VOL @ 456 DEG F (235 DEG C) [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-33] **PEER REVIEWED**

FLASH POINT

315 DEG F (157 DEG C) CLOSED CUP [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-33] **PEER REVIEWED**

FLASH POINT

171.1 deg C (open cup) [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 159] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

757 DEG F (402 DEG C) [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-33] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

EXTINGUISH WITH DRY CHEMICALS ... OR CARBON DIOXIDE. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

WATER OR FOAM MAY CAUSE FROTHING ... THE FROTHING MAY BE QUITE VIOLENT AND COULD ENDANGER THE LIFE OF THE FIRE FIGHTER. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-33] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

/Wear/ self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

THE THERMAL DECOMPOSITION OF DIBUTYL PHTHALATE WAS CARRIED OUT IN A FLOW SYSTEM @ 250-500 DEG C. THE MAJOR PRODUCTS WERE 1-BUTENE, BUTANOL & PHTHALIC ANHYDRIDE. SRP: PHTHALIC ANHYDRIDE IS VERY IRRITATING AND ALLERGENIC. [SAIDO ET AL; EISEI KAGAKU 27 (1): 16 (1981)] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Phthalic acid ester pyrolysis products include the formation of polycyclic aromatic hydrocarbons. /Phthalic acid esters/ [Bove JL, Dalven P; Pyrolysis of Phthalic Acid Esters. Sci Total Environ 36: 313-8 (1984)] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

LIQUID CHLORINE REACTS EXPLOSIVELY WITH DIBUTYL PHTHALATE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-55] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Nitrates; strong oxidizers, alkalis & acids; liquid chlorine. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

Contact may cause burns to skin and eyes. [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-31] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

CONTACT WITH SURFACE OF ... EYES ... BY ACCIDENTAL DROPLET SPLASH AS WELL AS BY EXPTL APPLICATION ... HAS CAUSED ... SEVERE STINGING PAIN. PAIN STIMULATES PROFUSE TEARING ... [Grant, W.M. Toxicology of the Eye. 3rd ed. Springfield, IL: Charles C. Thomas Publisher, 1986., p. 317] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

USE WITH /ADEQUATE/ VENTILATION ... SAFETY GLASSES SHOULD BE

WORN IN ANY TYPE OF INDUSTRIAL OPERATION. [Farm Chemicals Handbook 87. Willoughby, Ohio: Meister Publishing Co., 1987. C-86] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for dibutyl phthalate includes the following conditions: particulate concentration at 250 mg/cu m or less: a high efficiency particulate filter respirator with a full facepiece or any supplied-air respirator with a full facepiece, helmet, or hood or any self-contained breathing apparatus with a full facepiece; 9300 mg/cu m or less: Type-C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode; greater than 9,300 cu m or entry and escape from unknown concentrations: self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode or a combination respirator which includes a type-C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode; firefighting: self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

For di-n-butyl phthalate, breakthrough times greater than one hour reported by (normally) two or more testers for butyl rubber. For di-n-butyl phthalate, breakthrough times greater than one hour reported by (normally) two or more testers for neoprene. For di-n-butyl phthalate, breakthrough times greater than one hour reported by (normally) two or more testers for nitrile rubber. For di-n-butyl phthalate, breakthrough times greater than one hour reported by (normally) two or more testers for viton. There is some data for di-n-butyl phthalate suggesting breakthrough of approximately an hour or more for polyvinyl alcohol. [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.45 (1983)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 50 mg/cu m. Respirator Class(es): Any dust and mist respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 125 mg/cu m. Respirator Class(es): Any supplied-air respirator

operated in a continuous flow mode. Eye protection needed. Any powered, air-purifying respirator with a dust and mist filter. Eye protection needed. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 250 mg/cu m. Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 4000 mg/cu m. Respirator Class(es): Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 94] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

VENTILATION CONTROL: THE SYNTHESIS OF PHTHALATES REQUIRE GOOD VENTILATION IN ORDER TO PREVENT CONTAMINATION OF AIR WITH PHTHALIC ANHYDRIDE OR ALCOHOLS. /PHTHALATES/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 1059] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S.

Dept. of Health and Human Services, NIOSH/Supt., p. 97] of Documents, GPO, February 1987., p. 97] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE

EXCELLENT STABILITY TO LIGHT [Lefaux, R. Practical Toxicology of Plastics. Cleveland: CRC Press Inc., 1968., p. 137] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS NO DATA

STORAGE CONDITIONS NO DATA

CLEANUP METHODS

1) REMOVE ALL IGNITION SOURCES. 2) VENTILATE AREA ... 3) FOR SMALL QUANT, ABSORB ON PAPER TOWELS. EVAPORATE IN A SAFE PLACE (SUCH AS FUME HOOD). ALLOW SUFFICIENT TIME FOR EVAPORATING VAPORS TO COMPLETELY CLEAR HOOD DUCTWORK. BURN PAPER IN A SUITABLE LOCATION ... LARGE QUANT ... ATOMIZED IN ... COMBUSTION CHAMBER. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations-land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 119] Hazardous Materials Systems (BOE), 1987., p. 119] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations-water spill: Use natural barriers or oil spill control booms to limit spill motion. Use surface active agent (eg detergent, soaps, alcohols) to compress and thicken spilled material. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. Remove trapped material with suction hoses if dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concentration. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. [Association of American Railroads. Emergency

Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 119] Hazardous Materials Systems (BOE), 1987., p. 119] **PEER REVIEWED**

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Good candidate for incineration by liquid injection with a temperature of 650-1600 deg C with a residence time of 0.1-2 seconds; rotary kiln with a temperature of 820-1,600 deg C with a residence time for liquids and gases: seconds, solids: hours; fluidized bed with a temperature of 450-980 deg C with a residence time for liquids and gases: seconds, solids: longer. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-12 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dibutyl Phthalate; Concentration Process: Activated Carbon; Chemical Classification: Phthalates; Scale of Study: Batch flow, Laboratory scale; Type of Wastewater Used: Pure compound (one solute in a solvent); Results of Study: 100% reduction; 38% desorbed from carbon by elutriation with solvent; (Calgon FS-300 used. Solvents included pentane-acetone, diethyl ether, methylene chloride-acetone, chloroform-acetone, and acetone.) [Chriswell CD et al; J Amer Water Works Assoc 69 (12): 669-74 (1977) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-179 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dibutyl Phthalate; Concentration Process: Resin Adsorption; Chemical Classification: Phthalates; Scale of Study: Batch flow, Laboratory Scale; Type of Wastewater Used: Pure compound (one solute in a solvent; Results of Study: 100% reduction; 108% desorbed from resin by elutriation with solvent. (Amberlite XAD-2 used. Solvents included pentane- acetone, diethyl ether, methylene chloride-acetone, chloroform-acetone, and acetone.) [Chriswell CD et al; J Amer Water Works Assoc 69 (12): 669-74 (1977) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-200 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Dibutylphthalate may be disposed of: 1) By adsorbing it in vermiculite, dry sand, earth or a similar material and disposing in a secured sanitary landfill. 2) By atomizing in a suitable combustion chamber. Combustion may be improved by mixing with a more flammable solvent. Recommendable methods: Adsorption, landfill & incineration. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 258] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE DICHLOROPROPENE

CAS REGISTRY NUMBER 26952-23-8

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or Explosion: Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard. [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-29] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health Hazards: May be poisonous if inhaled. Contact may cause burns to skin and eyes. Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution. [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-29] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. If water pollution occurs, notify the appropriate authorities. [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-29] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Some of these materials may react violently with water. Small Fires: Dry chemical, CO2, water spray or regular foam. Large Fires: Water spray, fog or regular foam. Move container from fire area if you can do it without risk. Do not get water inside container. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-29] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or Leak: Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch or walk through spilled material; stop leak if you can do it without risk. Use water spray to reduce vapor; do not get water inside container. Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large Spills: Dike far ahead of liquid spill for later disposal. [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-29] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

First Aid: Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-29] **PEER REVIEWED**

FIRE POTENTIAL

Flammable liquid. [Roytech/SOCMA Suspect Chemicals Source Book. 4th ed. Burlingame, CA: Roytech Publications, 1985. IV-284] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA

FIRE FIGHTING PROCEDURES

If material /is/ on fire or involved in /a/ fire: Use water in flooding quantities as fog. Do not entinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 246] Hazardous Materials Systems (BOE), 1987., p. 246] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

Odor & intense irritation of eyes, skin, & resp mucosa. [Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984. III-141] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

IRRITATION OF EYES & UPPER RESP MUCOSA APPEARS PROMPTLY AFTER EXPOSURE TO CONCN VAPORS. LACRIMATION IS PROMINENT. ... SEVERE SKIN IRRITATION WITH MARKED INFLAMMATORY RESPONSE OF EPIDERMIS & UNDERLYING TISSUES /FROM DERMAL EXPOSURES/. /DICHLOROPROPENES/ [Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984. III-142] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Dichloropropene is strongly irritating to the skin, eyes, and respiratory tract. [Morgan DP; Recognition and Management of

Pesticide Poisonings. 4th ed. p.134 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear boots, appropriate chemical protective gloves, boots and goggles. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 246] Hazardous Materials Systems (BOE), 1987., p. 246] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear positive pressure self-contained breathing apparatus when fighting fires involving this material. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 246] Hazardous Materials Systems (BOE), 1987., p. 246] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If material 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 undue personnel hazard. Use water spray to knock-down vapors. /Dichloropropene and propylene dichloride mixture/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 246] Hazardous Materials Systems (BOE), 1987., p. 246] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Avoid breathing vapors. Keep upwind. ... Do not handle broken packages unless wearing appropriate personal protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 246] Hazardous Materials Systems (BOE), 1987., p. 246] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2

(10/1/90)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Domestic Transportation: Chemical: Dichloropropene. Primary Hazard Class: Flammable liquid. A flammable liquid is any liquid that has a flash point below 100 deg F (37 deg C). UN 2047. Label(s) required: Flammable liquid. Acceptable Modes of Transportation: Air, rail, road, and water. [49 CFR 172.101 (10/1/90)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Dichloropropene. IMO Class: 3. UN 2047. Primary hazard label: Flammable liquid (packaging group II). Additional packaging instructions listed in the table must also be followed. [IATA. Dangerous Goods Regulations. 33rd ed. Montreal, Canada/Geneva, Switzerland: International Air Transportation, Dangerous Goods Board, January 1992., p. 110] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Dichloropropene. IMO Class: 3.3, flammable liquids. UN 2047. Packaging Group: II. Label(s) required: Flammable liquid. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3130 (1988)] **PEER REVIEWED**

STORAGE CONDITIONS NO DATA

CLEANUP METHODS

Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, sawdust, or commercial sorbents. Apply fluorocarbon-water foam to diminish vapor and fire hazard. /Dichloropropene and propylene dichloride mixture/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 246] Hazardous Materials Systems (BOE), 1987., p. 246] **PEER REVIEWED**

CLEANUP METHODS

Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 246] Hazardous Materials Systems (BOE), 1987., p. 246] **PEER REVIEWED**

CLEANUP METHODS

Air spills: Apply water spray or mist to knock down vapors. Combustion products include corrosive or toxic vapors. [Association of American Railroads. Emergency Handling of

1 - HSDB

NAME OF SUBSTANCE DIELDRIN

CAS REGISTRY NUMBER 60-57-1

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs

Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

FIRE POTENTIAL

Not flammable [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FIRE POTENTIAL

Relatively extensive absorption by the dermal route has been an important factor leading to occupational poisoning by dieldrin. [Hayes, W.J., Jr., E.R. Laws, Jr., (eds.). Handbook of Pesticide Toxicology. Volume 2. Classes of Pesticides. New York, NY: Academic Press, Inc., 1991., p. 828] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA

FIRE FIGHTING PROCEDURES

If material is on fire: Extinguish fire using agent suitable for type of surrounding fire. Material itself does not burn or burns with difficulty. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.191 (1981)] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Toxic and irritating hydrogen chloride fumes may form in fire. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA

REACTIVITIES & INCOMPATIBILITIES

Incompatibilities: strong oxidizers, active metals like sodium, strong acids, phenols [NIOSH. Pocket Guide to Chemical Hazards. 5th Printing/Revision. DHHS (NIOSH) Publ. No. 85-114.

Washington, D.C.: U.S. Dept. of Health and Human Services,, p. 102] NIOSH/Supt. of Documents, GPO, Sept. 1985., p. 102] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, active metals such as sodium, strong acids, phenols. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

/Dieldrin/ reacts with concentrated mineral acids, acid catalysts. [Worthing, C.R. and S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 8th ed. Thornton Heath, UK: The British Crop Protection Council, 1987., p. 279] **PEER REVIEWED**

DECOMPOSITION

When heated to decomposition, emits highly toxic fumes of chlorides. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 976] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

0.041 ppm [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Wear rubber gloves, air breathing apparatus, and overalls. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 172] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Goggles or face shield. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

When opening containers, mixing, or applying the product, wear protective rubber or polyvinyl chloride gloves, rubber boots, and clean overalls. Wear dust mask when handling dust concentrates. [Farm Chemicals Handbook 87. Willoughby, Ohio: Meister Publishing Co., 1987. C-89] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Personnel protection: Wear boots, protective gloves, and goggles. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.191 (1981)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government

Printing Office, June 1994., p. 104] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration. Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator that has a full face piece and is operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Classes: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister. Any air-purifying respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 90] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ...

wear protective suits (preferably disposable, one piece & close fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... Gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 90] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Provide adequate ventilation. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 172] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees should wash immediately when skin is wet or contaminated. Working clothing should be changed daily if it is possible that clothing is contaminated. Remove nonimpervious clothing immediately if wet or contaminated. Provide emergency showers and eyewash. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 340] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Remove contaminated ... shoes. Flush affected areas with plenty of water. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If material is not on fire: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.191 (1981)] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Keep upwind. Avoid breathing vapors or dusts. Wash away any material which may have contacted the body with copious amounts of water or soap and water. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.191 (1981)] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Stop discharge if possible. Isolate and remove discharged material. Notify local health and wildlife officials. Notify operators of nearby water intakes. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should wash daily at the end of each work shift. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 104] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits

(preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... Clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... Unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing & use of dry dusters or mops should be prohibited. Grossly contaminated cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 11] **PEER REVIEWED**

STABILITY/SHELF LIFE

STABLE TO LIGHT [Spencer, E. Y. Guide to the Chemicals Used in Crop Protection. 7th ed. Publication 1093. Research Institute, Agriculture Canada, Ottawa, Canada: Information Canada, 1982., p. 203] **PEER REVIEWED**

STABILITY/SHELF LIFE

Resistant to moisture and alkalis. [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. Old Woking, Surrey, United Kingdom: Royal Society of Chemistry/Unwin Brothers Ltd., 1983. A144/Oct 83] **PEER REVIEWED**

STABILITY/SHELF LIFE

Stable to ... mild acids. [Farm Chemicals Handbook 1992. Willoughby, OH: Meister Publishing Co., 1992. C-115] **PEER REVIEWED**

STABILITY/SHELF LIFE

Stable to alkalis ..., but sensitive to concentrated mineral acids, acid catalysts, acid oxidizing agents, and active metals. [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987. A144/Aug 87] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995.] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.___ (1988)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary

container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

STORAGE CONDITIONS

Storage temp: ambient; venting: open (flame arrester) (for liquid form) [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **PEER REVIEWED**

CLEANUP METHODS

Absorb spills with paper towels. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 172] **PEER REVIEWED**

CLEANUP METHODS

Environmental conditions - Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, or sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.191 (1981)] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations - Water spill: Use natural barriers or oil spill control booms to limit spill motion. If dissolved, apply activated carbon at ten times the spilled amount in region of 10 ppm or greater concn. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.191 (1981)] **PEER REVIEWED**

CLEANUP METHODS

Survey reports six case histories employing EPA's hazardous materials spills treatment trailer are reviewed. The trailer's ... treatment system has three mixed-media filters and three activated carbon columns to remove suspended, precipitated, and organic soluble materials. Spills of PCB, pentachlorophenol, kepone, termide (chlordane), heptachlor, aldrin, and dieldrin, toxaphene, and dinitrobutylphenol were treated by the EPA trailer, which was generally successful in mitigating environmental effects by filtering and carbon-adsorption. 90% removal was achieved for 21 of 23 compounds. [Lafornara JP; WPCF J 50 (4): 617 (1978)] **PEER REVIEWED**

CLEANUP METHODS

The applicability of carbon to remove toxicants on EPA's published list and fish kill due to influent and effluent from five industrial plants currently using adsorption as a treatment method are examined. In the laboratory, activated carbon can achieve levels of less than 1 mg/l of aldrin, dieldrin, endrin, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethene, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, toxaphene, and aroclors 1254. In operating plants, the toxicity of wastes to fish due to unknown constituents is significantly reduced or totally removed by activated carbon treatment. [Bernardin FE, Froelich EM; Purdue Univ 30th Ind Waste Conf, May 6-8 p.548 (1975)] **PEER REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms ... Filter housing that is designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal ... The plastic bag should be sealed immediately ... The sealed bag should be labelled properly ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

Incineration (1500 deg F, 0.5 second minimum for primary combustion; 3200 deg F, 1.0 second for secondary combustion) with adequate scrubbing and ash disposal facilities. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p.

340] **PEER REVIEWED**

DISPOSAL METHODS

A good candidate for rotary kiln incineration at a temperature range of 820 to 1,600 deg C and residence times of seconds for liquids and gases, and hours for solids. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-8 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Dieldrin (15% emulsifiable concentrate and 72% chlordane emulsfiable concentrates. Mixed 1:3 ratio) /placed into a/ liquid injection incinerator with a temperature range of 877-1038 deg C and residence time of 0.153-1.71 sec with 45.8-51% excess air produced a destruction efficiency of >99.98%. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-3 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Chemical Precipitation; Chemical Classification: Pesticides; Scale of Study: Laboratory Scale/Continuous Flow; Type of Wastewater Used: River Water with Pure Compound; Influent Concentration: 10 ppb; Results of Study: 55% reduction with aluminum (chemical coagulation was followed by sand filtration). [Becker DL, Wilson SC; Carbon Adsorption Handbook p.167-213 (1978) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-76 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Reverse Osmosis; Chemical Classification: Pesticides; Scale of Study: Batch Flow; Type of Wastewater Used: Pure Compound; Influent Concentration: 321 ug; Results of Study: 99.9% reduction with CA membrane, 100% reduction with C-PEI membrane (membranes operated at 600 psig and room temperature). [Chian EK et al; Environmental Science and Technology (9) 1: 52-59 (1975) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-89 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Activated Carbon; Chemical Classification: Pesticides; Scale of Study: Isotherm Test; Type of Wastewater Used: Synthetic Wastewater; Influent Concentration: 19 ppb; Results of Study: 15 mg/g carbon capacity for a final concn of 0.05 ppb. [Hager DG; Chemical Enginering Progress 72 (10): 57-60 (1976) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-170 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Activated Carbon; Chemical Classification: Pesticides; Scale of Study: Laboratory Scale/Batch Flow/Isotherm Test; Type of Wastewater Used: Pure Compound; Influent Concentration: 19 ppb; Results of Study: 15 mg/g carbon capacity for a final concn of 0.08 ppb (pulverized FS-300). [Bernardin FE, Froelich EM; Proceeding 30th Industrial Waste Conference p.548-60 (1975) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-171 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Activated Carbon; Chemical Classification: Pesticides; Scale of Study: Pilot Scale/Continuous Flow; Type of Wastewater Used: Hazardous Material Spill; Influent Concentration: 11 ppb at 0.1 mg treated; Results of Study: No detectable level in effluent with 17 min contact time (treated by EPA mobile trailer). [Becker DL, Wilson SC; Carbon Adsorption Handbook p.167-213 (1978) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-171 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Activated Carbon; Chemical Classification: Pesticides; Scale of Study: Pilot Scale/Continuous Flow; Type of Wastewater Used: Hazardous Material Spill; Influent Concentration: 60.5 ppb at 3000 gal treated; Results of Study: No detectable level in effluent with 240 min contact time (treated by EPA mobile trailer). [Becker DL, Wilson SC; Carbon Adsorption Handbook p.167-213 (1978) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-171 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Activated Carbon; Chemical Classification: Pesticides; Scale of Study: Batch Flow/Laboratory Scale/Literature Review; Type of Wastewater Used: River Water with Pure Compound; Influent Concentration: 10 ppb; Results of Study: 75% removal with carbon concn of 5 mg/l, 85% removal with carbon concn of 10 mg/l, and 92% removal with carbon concn of 20 mg/l (cumulative removal following prechlorination and coagulation-sedimentation). [Becker DL, Wilson SC; Carbon Adsorption Handbook p.167-213 (1978) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-171 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Activated Carbon; Chemical Classification: Pesticides; Scale of Study: Continuous Flow/Laboratory Scale/Literature Review; Type of Wastewater Used: River Water with Pure Compound; Influent Concentration: 10 ppb at 0.5 gpm/cu ft; Results of Study: > 99% reduction was achieved (cumulative removal following prechlorination and coagulation-sedimentation). [Becker DL, Wilson SC; Carbon Adsorption Handbook p.167-213 (1978) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-171 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Dieldrin; Concentration Process: Activated Carbon; Chemical Classification: Pesticides; Scale of Study: Isotherm Test; Type of Wastewater Used: Industrial Wastewater; Influent Concentration: 19 ppb at pH= 7; Results of Study: 130 mg/g carbon for a final concentration of 0.1 ppb. [Nathan MF; Chemical Engineering 85 (3): 93 (1978) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-171 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Dieldrin like aldrin (from which it is derived by oxidation) is quite stable to heat (no decomposition @ 250 deg C) and to refluxing aqueous or alcoholic caustic. The instability of dieldrin to acids is similar to that of aldrin. Dieldrin is more resistant to oxidation than is aldrin, but is attacked by ozone. Reaction would be expected to occur @ the double bond and @ the epoxide to give the tetracarboxylic acid. Dieldrin is 100% degraded by sodium or lithium in liquid ammonia but this is not a practical disposal method. The MCA /Manufacturing Chemists Association/ recommends incineration methods for the disposal of dieldrin. Recommended method: Incineration. Recommendable method: Landfill. Peer-review: For dieldrin-mercury seed dressings long term storage is recommendable if they cannot be used. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 163] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number P037, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/91)] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 14] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 14] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known ... but 1-2 days is generally considered sufficient when freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for

Research on Cancer, 1979., p. 17] **PEER REVIEWED**
RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE DIETHYL PHTHALATE

CAS REGISTRY NUMBER 84-66-2

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION

Health: 0. 0= Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-38] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. ... Water fog gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-38] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-38] **PEER REVIEWED**

FLAMMABLE LIMITS

LOWER: 0.7% @ 368 DEG F. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-38] **PEER REVIEWED**

FLASH POINT

161 deg C (open cup) [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-38] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

(855 DEG F) 457 DEG C [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-38] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Dry chemical, foam, carbon dioxide [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Water or foam may cause frothing [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-38] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

IRRITATING VAPORS OF UNBURNED CHEMICAL MAY FORM IN FIRE [U.S.

Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS — NO DATA

EXPLOSIVE LIMITS AND POTENTIAL — NO DATA

REACTIVITIES & INCOMPATIBILITIES

May attack some forms of plastics. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, strong acids, nitric acid, permanganates, water. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 108] **QC REVIEWED**

DECOMPOSITION — NO DATA

POLYMERIZATION — NO DATA

OTHER HAZARDOUS REACTIONS — NO DATA

ODOR THRESHOLD — NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS — NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

RUBBER GLOVES; GOGGLES OR FACE SHIELD. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES — NO DATA

STABILITY/SHELF LIFE

STABLE TO LIGHT [Lefaux, R. Practical Toxicology of Plastics. Cleveland: CRC Press Inc., 1968., p. 136] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS — NO DATA

STORAGE CONDITIONS

Storage temp: ambient; venting: open. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

CLEANUP METHODS

A 2 year study was performed on an outdoor, prototype, slow-rate system to determine the removal efficiency for 16 organic substances in wastewater. The 16 organics were chloroform, benzene, toluene, chlorobenzene, bromoform, m-dichlorobenzene, dibromochloromethane, pentane, hexane, nitrobenzene, m-nitrotoluene, diethylphthalate, PCB 1242, naphthalene, phenanthrene and pentachlorophenol. The initial concentration of each of these substances in the wastewater was approximately 50 ug/l. Initial removal was via volatilization during spray application. The final concentration of substances after spraying correlated well their calculated liquid-phase transfer coefficients and the substances' initial concentration losses were up to 70% for the most volatile components. Total percent removal for the system, based on the residual concentration in the percolate, was > 98% for all substances. ... [Parker LV, Jenkins TF; Water Res 20 (11): 1417-26 (1986)]

PEER REVIEWED

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Good candidate for liquid injection incineration, with a temperature range of 650 to 1,600 deg C and a residence time of 0.1 to 2 seconds. Good candidate for rotary kiln incineration, with a temperature range of 820 to 1,600 deg C and a residence time of seconds. Also a good candidate for fluidized bed incineration, with a temperature range of 450 to 980 deg C and a residence time of seconds. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-12 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Atomize into an incinerator; combustion may be improved by mixing with a more flammable solvent. Recommendable methods: Incineration, landfill & use as boiler fuel. Peer-review: Adsorb on vermiculite or similar adsorbent and landfill. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 259] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE 2,4-DIMETHYLPHENOL

CAS REGISTRY NUMBER 105-67-9

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: TOXIC; inhalation, ingestion, or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. When heated, vapors may form explosive mixtures with air: indoors, outdoors, and sewers explosion hazards. Some may polymerize (P) explosively when heated or involved in a fire. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. /Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. /Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations.

/Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINER. /Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and

Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Xylenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA

FLASH POINT

>112 deg C (closed cup) [Dean, J.A. Handbook of Organic Chemistry. New York, NY: McGraw-Hill Book Co., 1987. 1-213] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA

ODOR THRESHOLD

0.001 mg/cu m (recognition in air); 0.0005-0.4 mg/cu m (detection in air) [Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983. 1195] **PEER REVIEWED**

ODOR THRESHOLD

0.4 mg/l (detection in water) [Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983., p. 1196] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Some data suggesting breakthrough times /for butyl rubber/ of approximately an hour or more. /Aromatic hydroxyl cmpd/ [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.78 (1983)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Breakthrough times /for neoprene/ greater than one hour reported by (normally) two or more testers. /Aromatic hydroxyl cmpd/ [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.78 (1983)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Breakthrough times /for polyvinyl alcohol/ less (usually ... /markedly/ less) than one hour reported by (normally) two or more testers. /Aromatic hydroxyl cmpd/ [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.78 (1983)] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Smoking, eating, and drinking before washing should be absolutely prohibited when any pesticide ... is being handled or used. /Pesticides/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1617] **PEER REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 230] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures

1 - HSDB

NAME OF SUBSTANCE DINOSEB

CAS REGISTRY NUMBER 88-85-7

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health Hazards: Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes. Runoff from fire control or dilution water may cause pollution. /Substituted nitrophenol pesticide, flammable liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-28] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or Explosion: Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion and poison hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard. /Substituted nitrophenol pesticide, flammable liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-28] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection. Structural firefighters' protective clothing is not effective with these materials. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. If water pollution occurs, notify the appropriate authorities. /Substituted nitrophenol pesticide, flammable liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-28] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small Fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Large Fires: Water spray, fog or alcohol-resistant foam. Move container from fire area if you can do it without risk. Dike fire-control water for later disposal; do not scatter the material. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. /Substituted nitrophenol pesticides, flammable liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-28] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or Leak: Shut off ignition sources; no flares, smoking or

flames in hazard area. Fully-encapsulating vapor-protective clothing should be worn for spills and leaks with no fire. Do not touch or walk through spilled material; stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces. Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large Spills: Dike far ahead of liquid spill for later disposal. /Substituted nitrophenol pesticide, flammable liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-28] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

First Aid: Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation. /Substituted nitrophenol pesticide, flammable liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-28] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health Hazards: Poisonous if swallowed. Inhalation of dust poisonous. Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution. /Substituted nitrophenol pesticide, solid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-53] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or Explosion: Some of these materials may burn, but none of them ignites readily. /Substituted nitrophenol pesticide, solid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-53] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. If water pollution occurs, notify the appropriate authorities. /Substituted nitrophenol pesticide, solid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-53] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small Fires: Dry chemical, CO2, water spray or regular foam. Large Fires: Water spray, fog or regular foam. Move container from fire area if you can do it without risk.

/Substituted nitrophenol pesticide, solid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-53] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or Leak: Do not touch or walk through spilled material; stop leak if you can do it without risk. Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Small Dry Spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area. Large Spills: Dike far ahead of liquid spill for later disposal. /Substituted nitrophenol pesticide, solid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-53] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

First Aid: Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. /Substituted nitrophenol pesticide, solid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-53] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health Hazards: Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes. Runoff from fire control or dilution water may give off poisonous gases and cause water pollution. Fire may produce irritating or poisonous gases. /Substituted nitrophenol pesticide, liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or Explosion: Some of these materials may burn, but none of them ignites readily. Container may explode violently in heat of fire. /Substituted nitrophenol pesticide, liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection. Structural firefighters' protective clothing is not effective for these materials. Remove and isolate contaminated clothing at the site. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available. /Substituted nitrophenol pesticide, liquid, not otherwise specified/ [U.S.

Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small Fires: Dry chemical, CO2, water spray or regular foam. Large Fires: Water spray, fog or regular foam. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Stay away from ends of tanks. Dike fire-control water for later disposal; do not scatter the material. /Substituted nitrophenol pesticide, liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or Leak: Do not touch spilled material; stop leak if you can do it without risk. Fully-encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire. 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 loosely; move containers from spill area. Large Spills: Dike far ahead of liquid spill for later disposal. /Substituted nitrophenol pesticide, liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

First Aid: Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material from skin is of extreme importance. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation. /Substituted nitrophenol pesticide, liquid, not otherwise specified/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-55] **PEER REVIEWED**

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT

15.6 DEG C, (CLOSED CUP) (DOW GENERAL WEED KILLER); 18.9 DEG C, (CLOSED CUP) (DOW SELECTIVE WEED KILLER) [Weed Science Society of America. Herbicide Handbook. 4th ed. Champaign, IL: Weed Science Society of America, 1979. of America, 1979., p. 174] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES NO DATA

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING NO DATA

HAZARDS

EXPLOSIVE LIMITS AND POTENTIAL — NO DATA

REACTIVITIES & INCOMPATIBILITIES — NO DATA

DECOMPOSITION — NO DATA

POLYMERIZATION — NO DATA

OTHER HAZARDOUS REACTIONS — NO DATA

ODOR THRESHOLD — NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

Staining of skin & minor irritation by very small amt. ... Mild to moderate irritation ... /of eyes/. Inhalation /of/ dusts may be irritating ... [Weed Science Society of America. Herbicide Handbook. 4th ed. Champaign, IL: Weed Science Society of America, 1979. of America, 1979., p. 176] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING — NO DATA

OTHER PREVENTIVE MEASURES

Smoking, eating, and drinking before washing should be absolutely prohibited when any pesticide ... is being handled or used. /Pesticides/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1619] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE

2-YEAR SHELF LIFE MINIMUM; DOW GENERAL WEED KILLER: 2-YEAR SHELF LIFE MINIMUM. [Weed Science Society of America. Herbicide Handbook. 4th ed. Champaign, IL: Weed Science Society of America, 1979. of America, 1979., p. 175] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (10/1/90)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Domestic Transportation: Chemical: Substituted nitrophenol pesticide, liquid, not otherwise specified (cmpds & prepn). Primary Hazard Class: Flammable liquid. A flammable liquid is any liquid that has a flash point below 100 deg F (37 deg C). UN 2780. Label(s) required: Flammable liquid. Acceptable Modes of Transportation: Air, rail, road, and water. /Substituted

nitrophenol pesticide, liquid, not otherwise specified (cmpds & prepn)/ [49 CFR 172.101 (10/1/90)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Substituted nitrophenol pesticides, liquid, flammable, toxic, not otherwise specified, flash point less than 23 deg C. IMO Class: 3. UN 2780. Primary hazard label: Flammable liquid & poison (packaging group I, II). Additional packaging instructions listed in the table must also be followed. Substituted nitrophenol pesticides, liquid, flammable, toxic, not otherwise specified, flash point less than 23 deg C is forbidden for transport on passenger aircraft. /Substituted nitrophenol pesticides, liquid, flammable, toxic, not otherwise specified, flash point less than 23 deg C/ [IATA. Dangerous Goods Regulations. 32nd ed. Montreal, Canada/Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1991, p. 189] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Substituted nitrophenol pesticides, liquid, flammable, toxic, not otherwise specified, flash point less than 23 deg C. IMO Class: 3.2, flammable liquids. UN 2780. Packaging Group: I, II. Label(s) required: Flammable liquid, poison, harmful, stow away from foodstuffs. /Substituted nitrophenol pesticides, liquid, flammable, toxic, not otherwise specified, flashpoint less than 23 deg C/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3097-1 (1988)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Domestic Transportation: Chemical: Substituted nitrophenol pesticide,solid or liquid, not otherwise specified, (cmpds & preparations). Primary Hazard Class: Poison B. A poison B is a substance that is known to be toxic to humans and poses a severe health hazard if released during transportation. UN 2779. Label(s) required: Poison. Acceptable Modes of Transportation: Air, rail, road, and water. /Substituted nitrophenol pesticide, solid or liquid, not otherwise specified, (cmpd & prepn)/ [49 CFR 172.101 (10/1/90)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Substituted nitrophenol pesticides, solid, toxic, not otherwise specified. IMO Class: 6.1. UN 2779. Primary hazard label: Poison, keep away from food (packaging group I, II, III). Additional packaging instructions listed in the table must also be followed. /Substituted nitrophenol pesticides, solid, toxic, not otherwise specified/ [IATA. Dangerous Goods Regulations. 32nd ed. Montreal, Canada/Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1991, p. 189] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Substituted nitrophenol pesticides, solid, toxic, not otherwise specified. IMO Class: 6.1, poisons. UN 2779. Packaging Group: I, II, III. Label(s) required: Poison, harmful, stow away from food stuffs. /Substituted nitrophenol pesticides, solid, toxic, not otherwise specified/ [IMDG; International Maritime Dangerous

Goods Code; International Maritime Organization p.6193 (1988)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Substituted nitrophenol pesticides, liquid, toxic, flammable, not otherwise specified, flashpoint 23 deg C or more. IMO Class: 6.1. UN 3013. Primary hazard label: Poison, keep away from food (packaging group I, II, III). Additional packaging instructions listed in the table must also be followed. /Substituted nitrophenol pesticides, liquid, toxic, flammable, not otherwise specified, flashpoint 23 deg C or more/ [IATA. Dangerous Goods Regulations. 32nd ed. Montreal, Canada/Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1991, p. 189] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Substituted nitrophenol pesticides, liquid, toxic, flammable, not otherwise specified, flash point between 23 deg C and 61 deg C. IMO Class: 6.1, poisons. UN 3013. Packaging Group: I, II, III. Label(s) required: Poison, flammable liquid, harmful, stow away from food stuffs. /Substituted nitrophenol pesticides, liquid, toxic, flammable, not otherwise specified, flashpoint between 23 deg C and 61 deg C/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6194 (1988)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Substituted nitrophenol pesticides, liquid, toxic, not otherwise specified. IMO Class: 6.1. UN 3014. Primary hazard label: Poison, keep away from food. Packaging group I, II, III). Additional packaging instructions listed in the table must also be followed. /Substituted nitrophenol pesticides, liquid, toxic, not otherwise specified/ [IATA. Dangerous Goods Regulations. 32nd ed. Montreal, Canada/Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1991, p. 189] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Substituted nitrophenol pesticide, liquid, toxic, not otherwise specified. IMO Class: 6.1, poisons. UN 3014. Packaging Group: I, II, III. Label(s) required: Poison, harmful, stow away from foodstuffs. /Substituted nitrophenol pesticides, liquid, toxic, not otherwise specified/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6193 (1988)] **PEER REVIEWED**

STORAGE CONDITIONS

MATERIALS WHICH ARE TOXIC AS STORED OR WHICH CAN DECOMPOSE INTO TOXIC COMPONENTS ... SHOULD BE STORED IN A COOL WELL VENTILATED PLACE, OUT OF THE DIRECT RAYS OF THE SUN, AWAY FROM AREAS OF HIGH FIRE HAZARD, AND SHOULD BE PERIODICALLY INSPECTED. INCOMPATIBLE MATERIALS SHOULD BE ISOLATED ... . [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 490] **PEER REVIEWED**

CLEANUP METHODS

Spillages of pesticides at any stage of their storage or handling should be treated with great care. Liquid formulations

may be reduced to solid phase by evaporation. Dry sweeping of solids is always hazardous: these should be removed by vacuum cleaning, or by dissolving them in water, or other solvent in the factory environment. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1619] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number P020, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/89)] **PEER REVIEWED**

DISPOSAL METHODS

Dinoseb is a good candidate for liquid injection incineration, with a temp range of 650 to 1,600 deg C and a residence time of 0.1 to 2.0 seconds. Also, a good candidate for rotary kiln incineration, with a temp range of 820 to 1,600 deg C with a residence time of seconds. Also, a good candidate for fluidized bed incineration, with a temp range of 450 to 980 deg C and a residence time of seconds. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-8 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead,

SEARCH TITLE:

DI-N-OCTYL PHTHALATE

SEARCH STRATEGY:

		POSTINGS
DATABASE	: HSDB-SAFE	
CHEM NAME/RN	: di-n-octyl phthalate	1

1 - HSDB

NAME OF SUBSTANCE	DI-N-OCTYL PHTHALATE
CAS REGISTRY NUMBER	117-84-0
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA

1 - HSDB

NAME OF SUBSTANCE	DI-N-OCTYL PHTHALATE
CAS REGISTRY NUMBER	117-84-0
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA

POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

... /IRRITATING TO/ MUCOUS MEMBRANES ... . [Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984. II-59] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

SYNTH OF PHTHALATES REQUIRE GOOD VENTILATION IN ORDER TO /MINIMIZE/ CONTAMINATION OF AIR WITH PHTHALIC ANHYDRIDE OR ALCOHOLS. THERE MAY BE ALSO SOME NEED FOR SKIN PROTECTION. HANDLING MINERAL ACIDS USED AS CATALYSTS REQUIRES ORDINARY PRECAUTIONS. /PHTHALATES/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 1059] **PEER

REVIEWED**

OTHER PREVENTIVE MEASURES

Increased /room/ ventilation and aspiration of vapors and dusts. /Phthalic esters/ [Lefaux, R. Practical Toxicology of Plastics. Cleveland: CRC Press Inc., 1968., p. 134] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lens use in industry is controversial. A survey of 100 corporations resulted in the recommendation that each company establish its own contact lens use policy. One presumed hazard of contact lens use is possible chemical entrapment. /It was/ found that contact lenses minimized injury or protected the eye. The eye was afforded more protection from liquid irritants. Soft contact lenses did not worsen corneal damage from strong chemicals and in some cases could actually protect the eye. Overall, the literature supports the wearing of contact lenses in industrial environments as part of the standard eye protection, eg, face shields; however, more data are needed to establish the value of contact lenses. [Randolph SA, Zavon MR; J Occup Med 29: 237-42 (1987)] **PEER REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS NO DATA

STORAGE CONDITIONS NO DATA

CLEANUP METHODS NO DATA

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U107, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/89)] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for di-n-octyl phthalate: Biological treatment, solvent extraction. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-3-E-22 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

A good candidate for liquid injection incineration at a temperature range of 650 to 1,600 deg C and a residence time of 0.1 to 2 seconds. A good candidate for fluidized bed incineration at a temperature range of 450 to 980 deg C and residence times of seconds for liquids and gases, and longer for solids. A good candidate for rotary kiln incineration at a temperature range of 820 to 1,600 deg C and residence times of seconds for liquids and gases, and hours for solids. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-13 (1981) EPA 68-03-3025] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

AN ACCESSION NUMBER: 1171. 9112.
CN CHEMICAL NAME: ETHYL BENZENE.
SY SYNONYMS: PHENYLETHANE. ETHYLBENZOL. NCI-C56393. UN 1175.
ETHYLBENZENE. BENZENE, ETHYL. EB. ALPHA-METHYLTOLUENE. STCC 490916:
RN CAS NUMBER: 100-41-4.

REG. TOXIC NUMBER: DA0700000.

CHEMICAL FORMULA: C8H10.

PD

PHYSICAL DESCRIPTION:
CLEAR, COLORLESS LIQUID WITH AN AROMATIC ODOR.

MOL WT:	106.17
BOILING PT:	277 F (136 C)
SOLUBILITY:	0.015%
FLASH PT:	59 F (15 C)
VAPOR PRES:	7.1 MMHG
MELT PT:	-139 F (-95 C)
UEL IN AIR:	6.7%
LEL IN AIR:	0.8%
MEC IN AIR:	810 F (432 C)
SPEC GRAVITY:	0.867
VAPOR DENSITY:	3.7
ODOR THRESHOLD:	140 PPM
OCTANOL/WATER CO-EFFICIENT:	3.15.

EL

PERMISSABLE EXPOSURE:
100 PPM OSHA TWA; 125 PPM OSHA STEL
100 PPM ACGIH TWA; 125 PPM ACGIH STEL
100 PPM NIOSH RECOMMENDED 10 HR TWA; 125 PPM NIOSH RECOMMENDED STEL
REPRODUCTIVE EFFECTS DATA (RTECS); MUTAGENIC DATA (RTECS)
AQUATIC TOXICITY RATING 2 (TLM96 10 - 100 PPM)
TLM96 - BLUEGILL 32 PPM (SOFT WATER), FATHEAD 48.51 PPM (SOFT WATER) - FATHEAD 42.33 PPM (HARD WATER)
CERCLA HAZARD RATINGS - TOXICITY 2 - IGNITABILITY 3 - REACTIVITY 0 - PERSISTENCE 3
TOXICOLOGY: ETHYL BENZENE IS A SKIN, EYE AND MUCOUS MEMBRANE IRRITANT. IT IS MODERATELY TOXIC BY INGESTION AND SLIGHTLY TOXIC BY SKIN ABSORPTION. ETHYL BENZENE IS A CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE LIVER. SYMPTOMS MAY INCLUDE A SENSE OF CHEST CONSTRICTION AND FUNCTIONAL NERVOUS DISORDERS. SKIN CONTACT MAY RESULT IN FIRST AND SECOND DEGREE BURNS.
THE ODOR CAN BE DETECTED AT 140 PPM AND IRRITATION OCCURS AT 200 PPM; THESE ARE CONSIDERED TO BE ADEQUATE WARNING PROPERTIES. THE THRESHOLD LIMIT VALUE WAS SET TO PREVENT SKIN AND EYE IRRITATION. PERSONS WITH PRE-EXISTING SKIN DISORDERS OR IMPAIRED PULMONARY, KIDNEY OR LIVER FUNCTION MAY BE AT INCREASED RISK FROM EXPOSURE.

ETHYL BENZENE MAY CROSS THE PLACENTA.
IHL-HMN TCLO: 100 PPM/8H ORL-RAT LD50: 3500 MG/KG
SKN-RBT LD50: 17,800 MG/KG IPR-MUS LD50: 2272 MG/KG
IHL-RAT LCLO: 4000 PPM/4H IHL-MUS LDLO: 50 GM/M3/2H
IHL-GPG LCLO: 10,000 PPM
SKIN AND EYE IRRITATION DATA (RTECS)
SKN-RBT 15 MG/24H MLD EYE-RBT 100 MG

OSHA STANDARD 1910.1200 HAZARD COMMUNICATION REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH TH PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING, MATERIAL SAFE DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

DANGEROUS EXPOSURE:
2000 PPM OSHA/NIOSH
CLEAR, COLORLESS LIQUID WITH A.

IC

INCOMPATIBILITIES:
ETHYL BENZENE: ACIDS (STRONG): POSSIBLE VIOLENT REACTION. AMMONIA: POSSIBLE VIOLENT REACTION. BASES (STRONG): POSSIBLE VIOLENT REACTION. OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD. PLASTICS: MAY BE ATTACKED. THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON. VAPOR-AIR MIXTURES ARE EXPLOSIVE. VAPORS ARE HEAVIER THAN AI AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLAS BACK. DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITAT MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

CL

CLOTHING:
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES CHEMICAL HAZARDS":
EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT NECESSARY TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE. FACE SHIELDS SHALL COMPLY WITH 29CFR1910.133(A)(2), (A)(4), (A)(5), AND (A)(6).
EMPLOYERS SHALL ENSURE THAT CLOTHING WET WITH THIS SUBSTANCE IS PLACED CLOSED CONTAINERS FOR STORAGE UNTIL IT CAN BE DISCARDED OR UNTIL THE EMPLOYER PROVIDES FOR THE REMOVAL OF THE CONTAMINANT FROM THE CLOTHING. IF THE CLOTHING IS TO BE LAUNDERED OR OTHERWISE CLEANED TO REMOVE THE CONTAMINANT, THE EMPLOYER SHALL INFORM THE PERSON PERFORMING THE CLEAN OPERATION OF THE HAZARDOUS PROPERTIES OF THE SUBSTANCE.
-ACGIH "GUIDELINES FOR THE SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATED THE FOLLOWING PROTECTIVE RATINGS FOR MATERIALS COMMONLY USED FOR PROTECTIVE CLOTHING. THESE RATINGS ARE BASED PRIMARILY ON QUANTITATIVE TEST RESULTS AND QUALITATIVE RESISTANCE INFORMATION. (THE RECOMMENDATIONS APPLY TO THE PURE SUBSTANCE ONLY; BREAKTHROUGH-TIME MA VARY FOR MIXTURES.) (A "+" DESIGNATES A BLEND OF MATERIALS, WHILE A "/ DESIGNATES A COATED OR LAMINATED MATERIAL.) -
AROMATIC HYDROCARBONS: EXCELLENT/GOOD: VITON GOOD/FAIR: CHLORINATED POLYETHYLENE VITON/NEOPRENE POOR/FAIR: BUTYL/NEOPRENE POOR: NATURAL RUBBER NEOPRENE NITRILE+POLYVINYL CHLORIDE POLYETHYLENE POLYVINYL CHLORIDE *** THERE IS A WIDE VARIATION IN RATINGS FOR THE FOLLOWING MATERIALS *** BUTYL RUBBER NITRILE RUBBER POLYVINYL ALCOHOL.

WEAR EYE PROTECTION TO PREVENT:

C:\PCPLUS\97800 01/31/92

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES F
CHEMICAL HAZARDS":
EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE SPLASH-PROOF SAFE
GOGGLES WHICH COMPLY WITH 29CFR1910.133(A)(2)-(A)(6) WHERE THIS LIQUID
MAY CONTACT THE EYES.

EMPLOYEE SHOULD WASH:
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES F
CHEMICAL HAZARDS":
EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE SKIN BECOMES CONTAMINATED
WITH THIS SUBSTANCE PROMPTLY WASH OR SHOWER TO REMOVE ANY CONTAMINANT
FROM THE SKIN.

WORK CLOTHING SHOULD BE CHANGED DAILY:
NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE CONTAMINANT
AND THE EXTENT OF EXPOSURE, CHANGE INTO UNCONTAMINATED CLOTHING BEFORE
LEAVING THE WORK PREMISES.

REMOVE CLOTHING:
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES F
CHEMICAL HAZARDS":
EMPLOYERS SHALL ENSURE THAT NON-IMPERVIOUS CLOTHING WHICH BECOMES
CONTAMINATED WITH THIS SUBSTANCE BE REMOVED PROMPTLY AND NOT REWORN UNT
THE SUBSTANCE IS REMOVED FROM THE CLOTHING.
EMPLOYERS SHALL ENSURE THAT ANY CLOTHING WHICH BECOMES WET WITH THIS
FLAMMABLE LIQUID BE REMOVED IMMEDIATELY AND NOT REWORN UNTIL THE
SUBSTANCE IS REMOVED FROM THE CLOTHING.

THE FOLLOWING EQUIPMENT SHOULD BE AVAILABLE:
NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE SUBSTANCE AN
THE PROBABILITY OF EXPOSURE, PROVIDE AN EYE WASH AND FACILITIES FOR QUI
DRENCHING OF THE BODY WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

RP

RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED):

1000 PPM
- POWERED AIR-PURIFYING RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDG
- SUPPLIED-AIR RESPIRATOR
- SELF-CONTAINED BREATHING APPARATUS
- CHEMICAL CARTRIDGE RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDGE

2000 PPM
- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONTOR BACK-MOUNTED CANISTER)
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACE-PIECE
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE

ESCAPE
- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONTOR BACK-MOUNTED CANISTER)
- APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE.

C:\PCPLUS\97800 01/31/92

MS

MEDICAL SURVEILLANCE:
EKG RECOMMENDED IF EMPLOYEE TO WEAR FULL-FACE RESPIRATOR.
GENERAL MEDICAL HISTORY.
40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS.
PHYSICIAN PRE-PLACEMENT AND ANNUAL EXAMS.
MEDICAL WARNING FOR REFUSAL OF MEDICAL EXAMINATION.
OSHA: CHRONIC RESPIRATORY DISEASE.
KIDNEY FUNCTION.
LIVER FUNCTION.
SKIN DISEASE.
OTHER MEDICAL SURVEILLANCE RECOMMENDED: BLOOD DISEASE.
EYE DISEASE.
ACGIH BIOLOGICAL EXPOSURE INDICES FOR ETHYL BENZENE: 2 G/L MANDELIC AC
IN URINE / TIMING--END OF SHIFT AND END OF WORKWEEK 1.5 G/G CREAT.
MANDELIC ACID IN URINE / TIMING -END OF SHIFT AND END OF WORKWEEK 2 PPM
ETHYL BENZENE IN END-EXHALED AIR /TIMING--PRIOR TO NEXT SHIFT.
29CFR1910.20 OSHA STANDARD SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSHA ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS RELEVANT TO EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL PHYSICAL AGENTS.
53FR38140 9/29/88 (AMENDED).

RE

ROUTE OF ENTRY:
INHALATION. INGESTION. SKIN ABSORPTION. SKIN OR EYE CONTACT.

TO

TARGET ORGANS:
EYES. SKIN. RESPIRATORY SYSTEM. CENTRAL NERVOUS SYSTEM.
GASTROINTESTINAL. LIVER.

SP

SYMPTOMS:
SKIN, COVERING OF BODY (SC0174);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090).
EYE, ORGAN OF SIGHT (SC0170);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090).
MUCOUS MEMBRANE, MEMBRANE LINING PASSAGES/CAVITIES (SC0109);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090). COUGHING, FORCE
EXPIRATION (SC0173). FATIGUE, TIREDNESS, SLUGGISH (SC0066). DEPRESS
DECREASE IN ACTIVITY/FUNCTION (SC0043). DIZZINESS, FEELING FAINT,
LIGHT-HEADED, UNSTEADY(SC0048). VERTIGO, FEELING OF WHIRLING MOTION
(SC0163). DYSPNEA, DIFFICULTY IN BREATHING (SC0052). HEADACHE, PAIN
HEAD OR CRANIUM AREA (SC0075). NARCOSIS, STUPOR OR SLEEP DUE TO NARCO
(SC0113). SLEEPINESS, DROWSINESS (SC0150). IRRITABILITY, QUICK
EXCITABILITY TO ANNOYANCE (SC0091).
SKIN, COVERING OF BODY (SC0174);
INFLAMMATION, EXTREME INFLAMMATORY TISSUE REACTION (SC0086).
SKIN, COVERING OF BODY (SC0174);
BURNS, TISSUE DAMAGE FROM HEAT (SC0175). LACRIMATION, DISCHARGE OF T
(SC0096).
ABDOMINAL, SECTION BETWEEN THORAX AND PELVIS (SC0750);
PAIN, SUFFERING, EITHER PHYSICAL OR MENTAL (SC0182). NAUSEA, SICKNES
THE STOMACH (SC0115). VOMITING, PERTAINING TO NAUSEA (SC0166).
PULARY, PERTAINING TO THE RESPIRATORY TRACT (SC0500);

HEMORRHAGE, BLEEDING (SC0080).
PULMONARY, PERTAINING TO THE RESPIRATORY TRACT (SC0500);
EDEMA, FLUID RETENTION WITH SWELLING (SC0181). COMA, STATE OF DEEP UNCONSCIOUSNESS (SC0583).
RESPIRATORY, PERTAINING TO THE LUNGS (SC0142);
PARALYSIS, LOSS OF POWER OF VOLUNTARY MOVEMENT (SC0124).
LIVER, BILE-SECRETING GLANDULAR ORGAN (SC0620);
EFFECTS, SIGNS AND SYMPTOMS (SC0579).
KIDNEY, POST-PERITONEUM ORGAN FOR URINE WASTE(SC0094);
EFFECTS, SIGNS AND SYMPTOMS (SC0579).
BLOOD, FLUID WHICH CARRIES NUTRIMENT AND OXYGEN TO BODY CELLS (SC0769);
EFFECTS, SIGNS AND SYMPTOMS (SC0579).
REPRODUCTIVE EFFECTS, BIRTH DEFECTS (SC0281);
IN EXPERIMENTAL ANIMALS, (SC0212).

FA

FIRST AID.

(1 OF 6)
IF THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LARG AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

(2 OF 6)
IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHO IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTIO IMMEDIATELY.

(3 OF 6)
IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH A IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

(4 OF 6)
INGESTION OF PETROLEUM DISTILLATES/HYDROCARBONS: EMERGENCY TREATMENT - PREVENT ASPIRATION. IF AMOUNT INGESTED EXCEEDS 1 ML/KG, OR IF TOXIC INGREDIENT IS PRESENT, SUBSTANCE MUST BE REMOVED. GASTRIC LAVAGE WITH ACTIVATED CHARCOAL AND CUFFED ENDOTRACHEAL TUBE TO PREVENT ASPIRATION SHOULD BE PERFORMED 15 MINUTES. IN ABSENCE OF DEPRESSION, CONVULSIONS GAG REFLEX, IPECAC EMESIS CAN ALSO BE DONE WITHOUT INCREASING ASPIRATIO HAZARD. WHEN VOMITING OCCURS, HOLD PATIENT WITH HEAD LOWER THAN HIPS T PREVENT ASPIRATION. AFTER VOMITING CEASES, GIVE 30-60 ML OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. FURTHER TREATMENT: GIVE ARTIFICIAL RESPIRATION WITH OXYGEN IF NECESSARY. SPECIAL TREATMENT: TREAT BACTERI ASPIRATION PNEUMONIA BY ORGANISM SPECIFIC CHEMOTHERAPY. TREAT PULMONAR EDEMA. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

(5 OF 6)
GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMAC TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING OR TAPE.

1 - HSDB

NAME OF SUBSTANCE FLUORANTHENE

CAS REGISTRY NUMBER 206-44-0

HAZARDS SUMMARY

The major hazards encountered in the use and handling of fluoranthene stem from its toxicologic properties. Toxic by all routes (ie, inhalation, ingestion, dermal contact), exposure to this pale yellow, crystalline substance may occur from its presence in coal tar products used in coatings for pipes and storage tanks, in roofing materials, and asphalt. Effects from exposure (based on analogy to phenol) may include contact burns to the skin and eyes, nausea, tachycardia, cardiac arrhythmias, liver injury, pulmonary edema, and respiratory arrest. In addition, NIOSH recommends that fluoranthene be regulated as an occupational carcinogen. In activities and situations where over-exposure via coal tar products may occur, wear a self-contained breathing apparatus, amd personal protective clothing to prevent skin contact. All such equipment and clothing should be removed in change rooms at the end of the workday, and maintained in a clean condition. Alsom workers should wash thoroughly at the end of the workday. While fluoranthene's fire hazard is only slight when exposed to heat and flame, it may be decomposed by heat, emitting acrid smoke and fumes. Spills of hot coal tar products may be covered with sand. Fluoranthene is a good candidate for disposal by rotary kiln or fluidized bed forms of incineration. Before implementing land disposal of fluoranthene, consult with environmental regulatory agencies for guidance. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

Fire Hazard /is/ slight, when exposed to heat or flame [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1421] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

Wear self contained breathing apparatus with a full facepiece operated in pressure demand or other positive pressure mode. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION

When heated to decomp, it emits acrid smoke and fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1421] **QC REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Eye and Face protection: Cup type or rubber framed chemical safety goggles shall be worn by employees engaged in activities in which coal tar products may come in contact with the eyes. When employees are exposed to airborne coal tar products in excess of the limits ... a respirator with a full facepiece is required. ... Full length, plastic face shields (20 cm min) shall be worn, in addition to safety goggles. Protective clothing: For employees working with heated coal tar pitch, employers shall require use of protective clothing sufficient to prevent skin contact. Employees handling drums, cans, or other large containers of coal tar products shall wear impervious shoes or boots with safety toe caps. Leather safety shoes shall be protected ... by impervious coverings such as rubbers. /Coal tar products/ [NIOSH; Criteria Document: Coal Tar Products p.7 (1977) DHEW Pub. NIOSH 78-107] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection from coal tar products for the following particulate concentration levels: 2 mg/cu m or less: A chemical cartridge respirator with an organic vapor cartridge(s) and with a fume or high efficiency filter or any supplied air respirator or any self contained breathing apparatus; 10 mg/cu m or less: A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s) and with a fume or high efficiency filter, or a gas mask with a chin style or a front or back mounted organic vapor canister and with a full facepiece and a fume or high efficiency filter, or any supplied air respirator with a full facepiece, helmet, or hood, or any self contained breathing apparatus with a full facepiece; 200 mg/ cu m or less: A type C supplied air respirator operated in pressure demand or other positive pressure or continuous flow mode, or a powered air purifying respirator with an organic vapor cartridge and a high efficiency particulate filter; 400 mg/cu m or less: A type C supplied air respirator with a full facepiece operated in pressure demand or other positive pressure mode, or with a full facepiece, helmet, or hood operated in continuous flow mode; Greater than 400 mg/cu m or entry and escape from unknown concentrations: Self contained breathing apparatus with a full facepiece operated in pressure demand or other positive pressure mode, or a combination respirator which includes a type C supplied air respirator with a full facepiece operated in pressure demand or other positive pressure or continuous flow mode and an auxillary self contained breathing apparatus operated in pressure demand or other positive pressure mode; Escape: Any gas mask providing protection against organic vapors and particulates, including

pesticide respirators which meet the requirements of this class, or any escape self contained breathing apparatus. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The employer shall ensure that ... all protective clothing is removed only in the change rooms ... and that contaminated protective clothing that is to be cleaned, laundered, or disposed of is placed in a closed container in the change room. /Coal tar products/ [NIOSH; Criteria Document: Coal Tar Products p.8 (1977) DHEW Pub. NIOSH 78-107] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

The NIOSH investigators concluded that coal tar pitch fumes during a roofing operation caused acute (short lived) eye and skin disorders in roofers, some of whom were exposed to concentrations of particulate polycyclic organic material (PPOM) greater than 0.2 mg/cu m of air. ... Incidence and severity of eye and skin effects depend on the concn of airborne particulate polycyclic organic material which ... depends on ... type of operation, ... type of pitch used, ... whether the pitch is heated, and ... environmental factors, such as wind. NIOSH recommended that roofers minimize the effects of coal tar pitch fumes by using protective measures. ... They should work upwind of pitch fumes and wash thoroughly at the end of the working day. /Coal tar products/ [NIOSH; Criteria Document: Coal Tar Products p.37 (1977) DHEW Pub. NIOSH 78-107] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

To prevent skin absorption of coal tar products ... do not use solvents to clean hands. ... /Coal tar products/ [NIOSH; Criteria Document: Coal Tar Products p.17 (1977) DHEW Pub. NIOSH 78-107] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Eating and food preparation or dispensing (including vending mechines) shall be prohibited where there is occupational exposure to coal tar products. /Coal tar products/ [NIOSH; Criteria Document: Coal Tar Products p.17 (1977) DHEW Pub. NIOSH 78-107] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

... A complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Clothing contaminated with coal tar pitch volatiles should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of the coal tar pitch volatiles from the contaminated clothing. Persons performing the operation should be informed of coal tar

pitch volatile's hazardous properties. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. /Coal tar pitch volatiles/ [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 84] of Documents, GPO, February 1987., p. 84] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Wash hands before eating or smoking and at the close of a workshift. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. Contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE

Does not undergo photooxidation in organic solvents under fluorescent light or sunlight; resistant to photodecomposition [IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, V32 356 (1983)]

1 - HSDB

NAME OF SUBSTANCE	FLUORENE
CAS REGISTRY NUMBER	86-73-7
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

Combustible [Lewis, R.J., Sr (Ed.). Hawley's Condensed Chemical Dictionary. 12th ed. New York, NY: Van Nostrand Rheinhold Co., 1993, p. 529] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. [SRP] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature supports the wearing of contact lenses in industrial environments, as part of a program to protect the eye against chemical compounds and minerals causing eye irritation. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases contact lenses should not be worn. [CITATION] **PEER REVIEWED**

STABILITY/SHELF LIFE	NO DATA
SHIPMENT METHODS AND REGULATIONS	NO DATA

STORAGE CONDITIONS

Local exhaust ventilation should be applied wherever there is an incidence of point source emmissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. [SRP] **PEER REVIEWED**

CLEANUP METHODS

The particle-bound portion of polycyclic aromatic hydrocarbons (PAH) can be removed by sedimentation, flocculation, and

filtration processes. The remaining ... dissolved polynuclear aromatic hydrocarbons usually requires oxidation for partial removal/transformation. /Polynuclear aromatic hydrocarbons/ [USEPA; Ambient Water Quality Criteria Doc: Polynuclear Aromatic Hydrocarbons (Draft) p.C-4 (1980)] **PEER REVIEWED**

DISPOSAL METHODS NO DATA

RADIATION LIMITS AND POTENTIAL NO DATA

1 - HSDB

NAME OF SUBSTANCE HEPTACHLOR

CAS REGISTRY NUMBER 76-44-8

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

Non-combustible [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 360] Hazardous Materials Systems (BOE), 1987., p. 360] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS

Heptachlor is not combustible, but may be dissolved in flammable liquids. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

If material 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. If large quantities of combustibles are involved, use water in flooding quantities as spray and fog. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 360] Hazardous Materials Systems (BOE), 1987., p. 360] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

When heated to decomposition, it emits highly toxic fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1496] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

... Hydrogen chloride fumes gas may form in fire. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

Heptachlor can react with iron and rust to form ... hydrogen chloride gas. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Hazardous reactions with alkali metals. [ITII. Toxic and

Hazardous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1988., p. 261] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Iron and rust. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

DECOMPOSITION

Decomposition products: Toxic gases and vapors which include: hydrogen chloride, and carbon monoxide. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

0.02 PPM [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Eye Irritant. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 120] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PROTECTIVE RESPIRATOR; RUBBER GLOVES; CLEAN CLOTHES. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to wear impervious clothing, gloves, and face shields (eight-inch minimum). ... [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for heptachlor is as follows: Particulate or vapor concentration: 5 mg/ cu m or less: Any self-contained breathing apparatus; 25 mg/cu m or less: Any supplied-air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece; 500 mg/cu m or less: A Type C supplied-air respirator operated in pressure-demand, or other positive pressure, or continuous-flow mode; 700 mg/cu m or less: A Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode, or with a full facepiece, helmet, or hood operated in continuous-flow mode; Greater than 700 mg/cu m or entry and escape from unknown concentrations: Self-contained breathing apparatus with a full facepiece operated in pressure-demand, or other positive pressure mode, or a combination respirator which includes a Type C supplied-air respirator with a full facepiece operated

in pressure-demand or other positive pressure mode; Escape: Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class or any self-contained breathing apparatus. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 5] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration.. Respirator Classes: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Escape Condition: Respirator Classes: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... Gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 120] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Wear appropriate equipment /clothing/ to prevent ... skin contact with heptachlor. ... Wash ... immediately when skin becomes contaminated. ... Work clothing should be changed daily if there is any possibility that it may be contaminated. ... Immediately remove non-impervious clothing that becomes contaminated. ... Wear eye protection to prevent ... eye contact. ... A quick drench eyewash /station/ should be available. ... [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health

Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Avoid breathing dust, and fumes from burning material. 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. If contact with the material anticipated, wear full protective clothing. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 360] Hazardous Materials Systems (BOE), 1987., p. 360] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Persons not wearing protective equipment and clothing should be restricted from areas of spills until cleanup has been completed. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If material is not involved in fire: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 360] Hazardous Materials Systems (BOE), 1987., p. 360] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Eating and smoking should not be permitted in areas where heptachlor or liquids containing heptachlor are worked with. Employees who handle heptachlor should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific

Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and

W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of administering volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or intratracheal instillation should be performed under hood. If chem will be exhaled, animals should be kept under hood during this period. Inhalation exposure requires special equipment. ... unless specifically required, routes of admin other than in the diet should be used. Mixing of carcinogen in diet should be carried out in sealed mixers under fume hood, from which the exhaust is fitted with an efficient particulate filter. Techniques for cleaning mixer & hood should be devised before expt begun. When mixing diets, special protective clothing &, possibly, respirators may be required. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": When ... admin in diet or applied to skin, animals should be kept in cages with solid bottoms & sides & fitted with a filter top. When volatile carcinogens are given, filter tops should not be used. Cages which have been used to house animals that received carcinogens should be decontaminated. Cage-cleaning facilities should be installed in area in which carcinogens are being used, to avoid moving of ... contaminated /cages/. It is difficult to ensure that cages are decontaminated, & monitoring methods are necessary. Situations may exist in which the use of disposable cages should be recommended, depending on type & amt of carcinogen & efficiency with which it can be removed. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": To eliminate risk that ... contamination in lab could build up during conduct of expt, periodic checks should be carried out on lab atmospheres, surfaces, such as walls, floors & benches, & ... interior of fume hoods & airducts. As well as regular monitoring, check must be carried out after cleaning-up of spillage. Sensitive methods are required when testing lab atmospheres. ... Methods ... should ... where possible, be simple & sensitive. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and

W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Rooms in which obvious contamination has occurred, such as spillage, should be decontaminated by lab personnel engaged in expt. Design of expt should ... avoid contamination of permanent equipment. ... Procedures should ensure that maintenance workers are not exposed to carcinogens. ... Particular care should be taken to avoid contamination of drains or ventilation ducts. In cleaning labs, procedures should be used which do not produce aerosols or dispersal of dust, ie, wet mop or vacuum cleaner equipped with high-efficiency particulate filter on exhaust, which are avail commercially, should be used. Sweeping, brushing & use of dry dusters or mops should be prohibited. Grossly contaminated cleaning materials should not be re-used ... If gowns or towels are contaminated, they should not be sent to laundry, but ... decontaminated or burnt, to avoid any hazard to laundry personnel. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 10] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 10] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Doors leading into areas where carcinogens are used ... should be marked distinctively with appropriate labels. Access ... limited to persons involved in expt. ... A prominently displayed notice should give the name of the Scientific Investigator or other person who can advise in an emergency & who can inform others (such as firemen) on the handling of carcinogenic substances. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 11] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 11] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

//wswd// [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 156] **QC REVIEWED**

STABILITY/SHELF LIFE

STABLE TO LIGHT, AIR, MOISTURE, AND MODERATE HEAT (UP TO 160 DEG C). [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. 2nd ed. Lechworth, Herts, England: The Royal Society of Chemistry, 1987. A225] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 189] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3097-1, 6193, 6194, 6195 (1988)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33.

Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **QC REVIEWED**

STORAGE CONDITIONS

Protect containers against physical damage. Outdoor or detached storage is preferred; in case of indoor storage, cool, well-ventilated, fire-proof place should be used and kept away from source of ignition. [ITII. Toxic and Hazardous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1988., p. 261] **PEER REVIEWED**

STORAGE CONDITIONS

PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemicophysical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 13] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13] **PEER REVIEWED**

CLEANUP METHODS

A PROCESS FOR REMOVING POLLUTANTS FROM DU PONT'S CHAMBERS WORKS PLANT IN DEEPWATER, NJ IS DESCRIBED. PROCESS INVOLVES NEUTRALIZATION OF WASTES & SETTLING, FOLLOWED BY COMBINED POWDERED CARBON-BIOLOGICAL PROCESS. AMONG PESTICIDES LISTED AS

PRIORITY POLLUTANTS ARE HEPTACHLOR & CHLORDANE. [HUTTON DG; IND WASTES (CHICAGO) 26 (2): 22, 24, 26 (1980)] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations: Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be contained with a flexible impermeable membrane liner./ Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 360] Hazardous Materials Systems (BOE), 1987., p. 360] **PEER REVIEWED**

CLEANUP METHODS

... Liquid containing heptachlor should be absorbed in vermiculite, dry sand, earth, or a similar material. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

CLEANUP METHODS

Treatment technologies which are capable of removing heptachlor from drinking water include adsorption by granular activated carbon and ozone or ozone/ultraviolet radiation. [USEPA/ODW; Health Advisory: Heptachlor/Heptachlor Epoxide (Draft) p.13 (1985)] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations: Water spill: Use nateral deep water pockets, excavated lagoons, or snad bag barriers to trap material at bottom. If 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 or greater concentration. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 360] Hazardous Materials Systems (BOE), 1987., p. 360] **PEER REVIEWED**

CLEANUP METHODS

Survey reports six case histories employing EPA's hazardous materials spills treatment trailer are reviewed. The trailer's ... treatment system has three mixed-media filters and three activated carbon columns to remove suspended, precipitated, and organic soluble materials. Spills of PCB, pentachlorophenol, kepone, termide (chlordane), heptachlor, aldrin, and dieldrin, toxaphene, and dinitrobutylphenol were treated by the EPA trailer, which was generally successful in mitigating environmental effects by filtering and carbon-adsorption. 90% removal was achieved for 21 of 23 compounds. [Lafornara JP; WPCF J 50 (4): 617 (1978)] **PEER REVIEWED**

CLEANUP METHODS

PRECAUTIONS FOR "CARCINOGENS": A high-efficiency particulate arrestor (HEPA) or charcoal filters can be used to minimize amt of carcinogen in exhausted air ventilated safety cabinets, lab hoods, glove boxes or animal rooms ... Filter housing that is

designed so that used filters can be transferred into plastic bag without contaminating maintenance staff is avail commercially. Filters should be placed in plastic bags immediately after removal ... The plastic bag should be sealed immediately ... The sealed bag should be labelled properly ... Waste liquids ... should be placed or collected in proper containers for disposal. The lid should be secured & the bottles properly labelled. Once filled, bottles should be placed in plastic bag, so that outer surface ... is not contaminated ... The plastic bag should also be sealed & labelled. ... Broken glassware ... should be decontaminated by solvent extraction, by chemical destruction, or in specially designed incinerators. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste numbers P059; D031, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

Heptachlor is a potential candidate for incineration by a rotary kiln with a temperature of 820-1600 deg C with a residence time for liquids and gases: seconds; Solids: hours. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-9 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165.9(a) (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

Group II Containers: Non-combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to a scrap metal facility for recycling, disposal or burial in a designated landfill. /Organic or metallo-organic pesticides/ [40 CFR 165.9(b) (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for heptachlor: Concentration process: Biological treatment. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-55 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for heptachlor: Concentration process: Reverse osmosis. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-89 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for heptachlor: Concentration process: Activated carbon. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-172 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 14] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 14] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 15] Problems of

Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": ... Small quantities of ... some carcinogens can be destroyed using chem reactions ... but no general rules can be given. ... As a general technique ... treatment with sodium dichromate in strong sulfuric acid can be used. The time necessary for destruction ... is seldom known ... but 1-2 days is generally considered sufficient when freshly prepd reagent is used. ... Carcinogens that are easily oxidizable can be destroyed with milder oxidative agents, such as saturated soln of potassium permanganate in acetone, which appears to be a suitable agent for destruction of hydrazines or of compounds containing isolated carbon-carbon double bonds. Concn or 50% aqueous sodium hypochlorite can also be used as an oxidizing agent. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 16] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 16] **PEER REVIEWED**

DISPOSAL METHODS

PRECAUTIONS FOR "CARCINOGENS": Carcinogens that are alkylating, arylating or acylating agents per se can be destroyed by reaction with appropriate nucleophiles, such as water, hydroxyl ions, ammonia, thiols & thiosulfate. The reactivity of various alkylating agents varies greatly ... & is also influenced by sol of agent in the reaction medium. To facilitate the complete reaction, it is suggested that the agents be dissolved in ethanol or similar solvents. ... No method should be applied ... until it has been thoroughly tested for its effectiveness & safety on material to be inactivated. For example, in case of destruction of alkylating agents, it is possible to detect residual compounds by reaction with 4(4-nitrobenzyl)-pyridine. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 17] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 17] **PEER REVIEWED**

DISPOSAL METHODS

Heptachlor and its hydrolytic product, 1-hydroxychlordene, were removed from aqueous solutions by air stripping, solvent sublation, and foam fractionation. The effects of air flow rate, added salt, ethanol, and surfactants were studied. Foam fractionation was found to be most effective, with 99% of heptachlor and 97% of 1-hydroxychlordene being removed from the aqueous solution in 5 min. This study shows that foam fractionation may find applicability for nonionic organic pollutants removal from aqueous solutions. Those nonionic organic pollutants which can be removed by solvent sublation may also be removed by foam fractionation with much better separation efficiency and no organic phase (such as paraffin oil) being required. [Chiu H-L, Huang S-D; Sep Sci Technol 26

(1): 73-84 (1991)] **PEER REVIEWED**
RADIATION LIMITS AND NO DATA
POTENTIAL

1 - HSDB

NAME OF SUBSTANCE	INDENO(1,2,3-CD)PYRENE
CAS REGISTRY NUMBER	193-39-5
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Good particulate emission controls are the indicated engineering control scheme where polynuclear aromatics are encountered in the workplace. /Polynuclear aromatic hydrocarbons/ [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 742] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent ... Safety pipettes ... for all pipetting. ... In animal laboratory ... protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators ... when working with particulates or gases, & disposable plastic aprons ... gowns ... /should be/ of distinctive color ... . /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Smoking, drinking, eating, storage of food or of food & beverage containers or utensils, & the application of cosmetics should be prohibited in any laboratory. All personnel should remove gloves, if worn, after completion of procedures in which carcinogens have been used. They should ... wash ... hands, preferably using dispensers of

liq detergent, & rinse ... thoroughly. Consideration should be given to appropriate methods for cleaning the skin, depending on nature of the contaminant. No standard procedure can be recommended, but the use of organic solvents should be avoided. Safety pipettes should be used for all pipetting. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": In animal laboratory, personnel should remove their outdoor clothes & wear protective suits (preferably disposable, one-piece & close-fitting at ankles & wrists), gloves, hair covering & overshoes. ... Clothing should be changed daily but ... discarded immediately if obvious contamination occurs ... /also,/ workers should shower immediately. In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. If gowns are of distinctive color, this is a reminder that they should not be worn outside of lab. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. [SRP] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": ... Operations connected with synth & purification ... should be carried out under well-ventilated hood. Analytical procedures ... should be carried out with care & vapors evolved during ... procedures should be removed. ... Expert advice should be obtained before existing fume cupboards are used ... & when new fume cupboards are installed. It is desirable that there be means for decreasing the rate of air extraction, so that carcinogenic powders can be handled without ... powder being blown around the hood. Glove boxes should be kept under negative air pressure. Air changes should be adequate, so that concn of vapors of volatile carcinogens will not occur. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for

a scrap metal facility for recycling, disposal or burial in a designated landfill. /Organic or metallo-organic pesticides/ [40 CFR 165.9 (b) (7/1/88)] **PEER REVIEWED**

DISPOSAL METHODS

Potential candidate for rotary kiln incineration with a temperature range of 820 to 1600 deg C with residence times for liquids and gases: seconds; solids: hours; Also, a potential candidate for fluidized bed incineration at 450-980 deg C with residence times fir liquids and gases: seconds; solids: longer; Also, a potential candidate for liquid injection incineration with a temperature range of 650-1600 deg C with a residence time of 0.1 to 2 seconds. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-16 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Herbicide orange /was incinerated/ by the use of two identical refractory lined furnaces on board the Mt Vulcanus while at sea. The average wall temperature was 1273 deg C and average flame was 1500 deg C. A residence time of 1.0 second was used. Combustion efficiency was > 99.98%. Destruction efficiency was: 2,4-D > 99.9%; 2,4,5-T > 99.9%; Total hydrocarbon 99.982 to 99.992%; Herbicide orange > 99.999%; TCDD > 99.93 to > 99.99%; Chlorinated hydrocarbons > 99.999%. /From table, herbicide orange/ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-3 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for 2,4,5-T: Concentration process: Biological treatment. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-56 (1982)] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

Aqueous hypochlorite at pH 3 and temp above 30 deg C will yield herbicidally inactive products, but the products have not been characterized. At high temp (about 400 deg C) chlorinolysis can degrade 2,4,5-T to a mixture of carbon tetrachloride, phosgene, and hydrogen chloride. None of these reactions are practical detoxification approaches for 2,4,5-T. Chemical treatment is not considered a viable approach for degrading the trace quantities of TCDD /2,3,7,8-tetrachlorodibenzo-p-dioxin/. Cleavage of the ether and dechlorination requires highly reactive chemical reagents, such as strong acid or sodium amide. Both 2,4,5-T and 2,3,7,8-tetrachlorodibenzo-p-dioxin are degraded by photochemical reactions. 2,4,5-T is detoxified by microbial activity in a period of 45 to 270 days. The biodegradation is most rapid in warm, aerated, moist soils, and aerobic activity is preferred.
2,3,7,8-tetrachlorodibenzo-p-dioxin is relatively persistent in soil. Approx 60% was recovered after 1-100 ppm 2,3,7,8-tetrachlorodibenzo-p-dioxin was incubated for one year in loamy sand or silty clay loam. It would appear that 2,3,7,8-tetrachlorodibenza-p-dioxin could build up in soil if 2,4,5-T containing trace amounts of 2,3,7,8-tetrachlorodibenzo-p-dioxin were disposed by land burial. In summary, no practical chemical detoxification procedures are now available for waste 2,4,5-T. The photochemical degradation to remove traces of 2,3,7,8-tetrachlorodibenzo-p- dioxin is an interesting approach for spill clean-up but not for disposal. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 74] **PEER REVIEWED**

DISPOSAL METHODS

2,4,5-T (Weedon TM) 20% active ingredient was incinerated in a municipal multiple hearth sewage sludge incinerator with a temperature range of 457-940 deg C with 6-10% excess air, the destruction efficiency was 99.980-99.996%. /From table, residence time not specified/ [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-6 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165.9 (a) (7/1/88)] **PEER REVIEWED**

DISPOSAL METHODS

Group II Containers: Noncombustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to

Domestic Transportation: Chemical: 2,4,5-Trichlorophenoxyacetic acid amine, ester, or salt. NA 2765. Label(s) required: None. Acceptable Modes of Transportation: Air, rail, road, and water. /2,4,5-Trichlorophenoxyacetic acid amine, ester, or salt/ [49 CFR 172.101 (10/1/87)] **PEER REVIEWED**

STORAGE CONDITIONS

DO NOT STORE NEAR OTHER AGROCHEMICALS OR SEEDS. DO NOT STORE IN FREEZING TEMPERATURES. [Farm Chemicals Handbook 1989. Willoughby, OH: Meister Publishing Co., 1989. C-277] **PEER REVIEWED**

CLEANUP METHODS

1. VENTILATE AREA OF SPILL. 2. 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. LIQUID CONTAINING 2,4,5-T SHOULD BE ABSORBED IN VERMICULITE, DRY SAND, EARTH, OR A SIMILAR MATERIAL. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

CLEANUP METHODS

Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 694] Hazardous Materials Systems (BOE), 1987., p. 694] **PEER REVIEWED**

CLEANUP METHODS

Water spill: Remove trapped material with suction hoses. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 694] Hazardous Materials Systems (BOE), 1987., p. 694] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste numbers F027 & U232, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/89)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical treatment: 2,4,5-T /2,4,5-trichlorophenoxyacetic acid/ is cleaved by strong acid to 2,4,5-trichlorophenol, formaldehyde and carbon dioxide. Glycollic acid appears to be an intermediate. This hydrolysis requires heating with concentrated acid or pyridine hydrochloride. 2,4,5-T is completely degraded by alkali metals (sodium or lithium) in liquid ammonia, but the degradation products have not been identified. Chlorination is capable of destroying 2,4,5-T.

specified, flash point less than 23 deg C/ [IATA. Dangerous Goods Regulations. 30th ed. Montreal, Canada: International Air Transport Association. Dangerous Goods Board, January 1, 1989., p. 167] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Phenoxy pesticides, liquid, flammable, toxic, not otherwise specified. IMO Class: 3.2, Flammble liquids, intermediate flashpoint group. UN 2766. Packaging Group: I,II. Label(s) required: Flammable liquid, poison. /Phenoxy pesticides, liquid, flammable, toxic, not otherwise specified/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3097-1 (1988)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Phenoxy pesticides, liquid, toxic, flammable, not otherwise specified, flashpoint 23 deg C or more. IMO Class: 6.1. UN 2999. Primary hazard label: Poison (packaging group I,II). Additional packaging instructions listed in the table must also be followed. Primary hazard label: Keep away from food (packaging group III). /Phenoxy pesticides, liquid, toxic, flammable, not otherwise specified, flashpoint 23 deg C or more/ [IATA. Dangerous Goods Regulations. 30th ed. Montreal, Canada: International Air Transport Association. Dangerous Goods Board, January 1, 1989., p. 167] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Phenoxy pesticides, liquid, toxic, flammable, not otherwise specified. IMO Class: 6.1, Poisons. UN 2999. Packaging Group: I,II. Label(s) required: Poison. Packaging group: III. Label(s) required: Harmful stow away from foodstuffs, flammable liquid. /Phenoxy pesticides, liquid, toxic, flammable, not otherwise specified/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6194 (1988)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Phenoxy pesticide, liquid, toxic, not otherwise specified. IMO Class: 6.1. UN 3000. Primary hazard label: Poison (packaging group I,II). Additional packaging instructions listed in the table must also be followed. Primary hazard label: Keep away from food (packaging group III). /Phenoxy pesticides, liquid, toxic, not otherwise specified/ [IATA. Dangerous Goods Regulations. 30th ed. Montreal, Canada: International Air Transport Association. Dangerous Goods Board, January 1, 1989., p. 167] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Phenoxy pesticides, liquid, toxic, not otherwise spoecified. IMO Class: 6.1, Poisons. UN 3000. Packaging Group: I,II. Label(s) required: Poison. Packaging group: III. Label required: Harmful stow away from foodstuffs. /Phenoxy pesticides, liquid, toxic, not otherwise specified/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6193 (1988)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

acid. Primary Hazard Class: ORM-A. An ORM-A (Other Regulated Material-A) is a material that has an anesthetic, irritating, noxious, toxic, or other similar property, that can cause extreme annoyance or discomfort to passengers or crew in the event of leakage. UN 2765. Label(s) required: None. Acceptable Modes of Transportation: Air, rail, road, and water. [49 CFR 172.101 (10/1/87)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Domestic Transportation: Chemical: Phenoxy pesticide liquid or solid, not otherwise specified (compounds and preparations). Primary Hazard Class: Poison B. A poison B is a substance that is known to be toxic to humans and poses a severe health hazard if released during transportation. UN 2765. Label(s) required: Poison. Acceptable Modes of Transportation: Air, rail, road, and water. /Phenoxy pesticide, liquid or solid, not otherwise specified (compounds and preparations)/ [49 CFR 172.101 (10/1/87)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Phenoxy pesticides, solid, toxic, not otherwise specified. IMO Class: 6.1. UN 2765. Primary hazard label: Poison (packaging group I, II). Additional packaging instructions listed in the table must also be followed. Primary hazard label: Keep away from food (packaging group III). /Phenoxy pesticides, solid, toxic, not otherwise specified/ [IATA. Dangerous Goods Regulations. 30th ed. Montreal, Canada: International Air Transport Association. Dangerous Goods Board, January 1, 1989., p. 167] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

International Water Shipments: Chemical: Phenoxy pesticides, solid, toxic, not otherwise specified. IMO Class: 6.1 Poison. UN 2765. Packaging Group: I,II. Label(s) required: Poison. Packaging group: III. Label required: Harmful stow away from foodstuffs. /Phenoxy pesticides, solid, toxic, not otherwise specified/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6195 (1988)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Domestic Transportation: Chemical: Phenoxy pesticide, liquid, not otherwise specified (compounds and preparations). Primary Hazard Class: Flammable liquid. A flammable liquid is any liquid that has a flash point below 100 deg F (37 deg C). UN 2766. Label(s) required: Flammable liquid. Acceptable Modes of Transportation: Air, rail, road, and water. /Phenoxy pesticide, liquid, not otherwise specified (compounds and preparations)/ [49 CFR 172.101 (10/1/87)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Chemical: Phenoxy pesticides, liquid, flammable, toxic, not otherwise specified, flashpoint less than 23 deg C. IMO Class: 6.1. UN 2766. Primary hazard label: Flammable liquid, Poison (packaging group I,II). Phenoxy pesticides, liquid, flammable, toxic, not otherwise specified, flashpoint less than 23 deg C (packaging group I) is forbidden for transport on passenger aircraft. Additional packaging instructions listed in the table must also be followed. /Phenoxy pesticides, liquid, flammable, toxic, not otherwise

OTHER PREVENTIVE MEASURES

Eating and smoking should not be permitted in areas where 2,4,5-T is handled, processed, or stored. Employees who handle 2,4,5-T should wash their hands thoroughly with soap or mild detergent & water before eating, smoking, or using the toilet facilities. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If material /is/ not involved in fire: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Keep upwind. ... Avoid breathing vapors or dusts. Wash away any material which may have contacted the body with copious amounts of water or soap and water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 694] Hazardous Materials Systems (BOE), 1987., p. 694] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

DO NOT USE SPRAY EQUIPMENT CONTAMINATED WITH THIS PRODUCT FOR ANY OTHER PURPOSE UNLESS THOROUGHLY CLEANED WITH A SUITABLE CLEANER. AVOID DRIFT AND VOLATILIZATION NEAR SUSCEPTIBLE CROPS SUCH AS CERTAIN ORNAMENTALS, TOMATOES, AND GRAPES. ... DO NOT USE NEAR LAKES, STREAMS, AND PONDS. [Farm Chemicals Handbook 1989. Willoughby, OH: Meister Publishing Co., 1989. C-277] **PEER REVIEWED**

STABILITY/SHELF LIFE

STABLE @ ITS MELTING-POINT [IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, V15 273 (1977)] 1972-PRESENT. (Multivolume work). V15 273 (1977)] **PEER REVIEWED**

STABILITY/SHELF LIFE

SHELF LIFE EXCELLENT DEPENDING UPON MFR & FORMULATION; 2-YR MINIMUM [Weed Science Society of America. Herbicide Handbook. 5th ed. Champaign, Illinois: Weed Science Society of America, 1983., p. 445] **PEER REVIEWED**

STABILITY/SHELF LIFE

Conditions leading to instability: Temperatures above 158 deg C may cause sealed metal containers to burst. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (10/1/89)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Domestic Transportation: Chemical: 2,4,5-Trichlorophenoxyacetic

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 292] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 215] of Documents, GPO, February 1987., p. 215] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Avoid action on skin, eyes, and respiratory tract and the continuous intake of small amounts. Very important to avoid drifting of spray clouds. Keep away from food, feeds, and water. [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. Old Woking, Surrey, United Kingdom: Royal Society of Chemistry/Unwin Brothers Ltd., 1983. A375/Oct 83] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Persons not wearing protective equipment should be restricted from areas of spills until cleanup has been completed. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Good industrial practices recommend that engineering controls be used to reduce environmental concentrations to the permissible exposure level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2629] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

Irritant to eyes, nose, and throat. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 503] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate chemical protective gloves, boots and goggles. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 694] Hazardous Materials Systems (BOE), 1987., p. 694] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 50 mg/cu m. Respirator Class(es): Any dust and mist respirator. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 292] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 100 mg/cu m. Respirator Class(es): Any dust and mist respirator except single-use and quarter-mask respirators. Any supplied-air respirator. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 292] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 250 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any powered, air-purifying respirator with a dust and mist filter. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 292] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 292] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

First Aid: Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material from skin is of extreme importance. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation. [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-55] **PEER REVIEWED**

FIRE POTENTIAL

Material does not burn or burns with difficulty. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 694] Hazardous Materials Systems (BOE), 1987., p. 694] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

/Wear/ self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode /when fighting fire/. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguish fire using agent suitable for type of surrounding fire. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 694] Hazardous Materials Systems (BOE), 1987., p. 694] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Toxic hydrogen chloride & phosgene gases may be formed /during combustion/. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION

Toxic gases and vapors /which include/: hydrogen chloride and carbon monoxide. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

DECOMPOSITION

When heated to decomp it emits toxic fumes of chlorine. [Sax,

1 - HSDB

NAME OF SUBSTANCE 2,4,5-T

CAS REGISTRY NUMBER 93-76-5

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health Hazards: Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes. Runoff from fire control or dilution water may give off poisonous gases and cause water pollution. Fire may produce irritating or poisonous gases. [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or Explosion: Some of these materials may burn, but none of them ignites readily. Container may explode violently in heat of fire. [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Self-contained breathing apparatus and chemical protective clothing which is specifically recommended by the shipper or producer may be worn but they do not provide thermal protection unless it is stated by the clothing manufacturer. Structural firefighter's protective clothing is not effective with these materials. Remove and isolate contaminated clothing at the site. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available. [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small Fires: Dry chemical, CO2, Halon, water spray or standard foam. Large Fires: Water spray, fog or standard foam is recommended. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Stay away from ends of tanks. Dike fire control water for later disposal; do not scatter the material. [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

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 noncombustible absorbent material and place into containers for later disposal. Small Dry Spills: With clean shovel place material into clean, dry container and cover; move containers from spill area. Large Spills: Dike far ahead of liquid spill for later disposal. [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-55] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

by distilliation is recycled. ... If possible, convert selenium compounds to an insoluble form with SO2 before landfill or solidification. Do not use metal and acid to reduce selenium compounds. This will produce toxic gaseous hydrogen selenide. /Selenium compounds/ [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 278] **PEER REVIEWED**

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Depending upon the industrial source, selenium occurs in either the particulate or the soluble form. For the former, physical treatment processes such as sedimentation or filtration are quite effective. Lime precipitation of soluble selenium has been shown to be ineffective. Alum coagulation/coprecipitation is somewhat effective, with removal efficiencies approaching 50% achievable. Iron coagulation/coprecipitation is capable of above 80% selenium removal, with efficiency increasing with decreasing pH. Activated carbon adsorption is not effective, except in one reported instance involving high pH pretreatment. The most efficient process for soluble selenium appears to be anion exchange. Preoxidation of the selenite to selenate is reported to enhance exchange capacity. /Selenium compounds/ [Patterson JW; Industrial Wastewater Treatment Technology 2nd Edition p.402 (1985)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Selenium; Concentration Process: Chemical Precipitation; Chemical Classification: Metals; Scale of Study: Full Scale/Continous flow; Type of Wastewater Used: Domestic; Influent concentration: <2.5 ppb/ 6.5 ppb. Results of Study: 0% reduction with lime; (Lime dose of 350-400 ppm as calcium oxide at pH= 11.3). /Selenium cmpd/ [McCarty PL et al; Water Factory 21: Reclaimed Water, Volatile Organics, Virus, and Treatment Performance (1978) EPA-600/2-78-076 as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-73 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Selenium; Concentration Process: Chemical Precipitation; Chemical Classification: Metal; Scale of Study: Pilot Scale; Type of Wastewater Used: Synthetic; Influent concentration: 100 ppb Results of Study: 75% reduction with ferric chloride; (3 coagulants used: 220 ppm of alum at pH= 6.4; 40 ppm of ferric chloride at pH= 6.2; 415 ppm of lime at pH= 11.5; chemical coagulation was followed by dual media filtration). /Selenium cmpd/ [Hannah SA et al; J Water Pollut Cont Fed 49 (11): 2297-309 (1977) as cited in USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-73 (1982)] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

Government Printing Office, June 1994., p. 276] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 276] **QC REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6219 (1988)] **QC REVIEWED**

STORAGE CONDITIONS

Usually stored at room temperature. Precautions must be taken to avoid contact with water or prolonged exposure to air and other materials with which it may react. Storage area construction must be such that rain water will not leak in or ground water will not enter. Used drums should be stored in this same dry area to avoid contamination /SRP: of the area/ and to minimize any hazard due to the residues. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 460] **PEER REVIEWED**

CLEANUP METHODS

1. VENTILATE AREA OF SPILL. 2. COLLECT SPILLED MATERIAL IN MOST CONVENIENT & SAFE MANNER & DEPOSIT IN SEALED CONTAINERS FOR RECLAMATION OR FOR DISPOSAL IN A SECURED SANITARY LANDFILL. LIQ CONTAINING SELENIUM & ITS INORGANIC CMPD SHOULD BE ABSORBED IN VERMICULITE, DRY SAND, EARTH, OR SIMILAR MATERIAL. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

CLEANUP METHODS

... As the price of selenium is very high; recovery of it by processing selenium containing waste is economical. For example, selenium refineries are equipped with wet scrubbers that employ an approx 50% soln of hydrobromic acid containing free bromine. The acid fumes are adsorbed in a lime and soda bed, and the selenium separated from the hydrobromic acid soln

Non-impervious clothing which becomes contaminated with selenium, sodium selenite, sodium selenate, selenium dioxide or liquids containing these compounds should be removed promptly and not reworn until the contaminant is removed from the clothing. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Eye Exposure: If selenium or its inorganic compounds get into the eyes, wash eyes immediately with large amounts of water, lifting the lower and upper lids occasionally. Get medical attention immediately. Contact lenses should not be worn when working with these chemicals. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Skin Exposure: If selenium or its inorganic compounds get on the skin, immediately wash the contaminated skin. If selenium, sodium selenite, sodium selenate, or selenium dioxide soak through the clothing, remove the clothing immediately and wash the skin. If irritation persists after washing, get medical attention. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 5] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

ELEMENTAL SELENIUM PARTICULARLY IN SHOTTED VITREOUS FORM & FREE FROM DUST CAN BE HANDLED WITHOUT PARTICULAR PRECAUTION. HOWEVER, IF ... REFINED BY DISTILLATION OR HEATED IN AIR ABOVE ITS MP & RED FUMES ARE GIVEN OFF, THESE FUMES MAY CONTAIN UP TO 50% SELENIUM DIOXIDE & ... DUST MUST BE TREATED /AS SUCH/. [Friberg, L., G.R. Nordberg, and V.B. Vouk. Handbook on the Toxicology of Metals. New York: Elsevier North Holland, 1979., p. 572] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S.

self-contained breathing apparatus with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 276] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 276] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 276] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Smoking, eating and drinking at the workplace should be prohibited and messrooms and sanitary facilities including showers and locker rooms should be provided at a point distant from exposure areas. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 2018] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Where there is any possibility of exposure of an employee's body to selenium, selenium oxychloride, sodium selenite, sodium selenate, selenium dioxide, or liquids containing these compounds, facilities for quick drenching of the body should be provided within the immediate work area for emergency use. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees should be provided with and required to use impervious clothing, gloves, face shields (eight inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with selenium, sodium selenite, or sodium selenate. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

POLYMERIZATION NO DATA
OTHER HAZARDOUS REACTIONS NO DATA
ODOR THRESHOLD NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS

... /Elemental/ selenium dusts produce respiratory tract irritation manifested by nasal discharge, loss of smell, epistaxis, and cough. [Ellenhorn, M.J. and D.G. Barceloux. Medical Toxicology - Diagnosis and Treatment of Human Poisoning. New York, NY: Elsevier Science Publishing Co., Inc. 1988., p. 1059] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented. Respirators may also be used for operations which require entry into tanks or closed vessels, and in emergency situations. If the use of repirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 276] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 276] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 1 mg/cu m. Respirator Class(es): Any dust and mist respirator. If not present as a fume. May require eye protection. Any dust, mist, and fume respirator. May require eye protection. Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any powered, air-purifying respirator with a dust and mist filter. If not present as a fume. May require eye protection. Any powered, air-purifying respirator with a dust, mist, and fume filter. May require eye protection. Any supplied-air respirator. May require eye protection. Any

CHLORINE TRIFLUORIDE REACT VIGOROUSLY WITH SELENIUM, PRODUCING FLAME. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-25] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

LITHIUM CARBIDE BURNS IN VAPOR OF SELENIUM. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-204] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

URANIUM REACTS WITH INCANDESCENCE WITH HOT SELENIUM. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-220] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

THE REACTION BETWEEN ZINC & SELENIUM IS ACCOMPANIED BY INCANDESCENCE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-223] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

WHEN POWDERED NICKEL IS HEATED WITH SELENIUM, THE ELEMENTS UNITE WITH INCANDESCENCE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-133] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

SELENIUM VAPOR ATTACKS HEATED THORIUM CARBIDE WITH INCANDESCENCE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-212] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

SELENIUM + POTASSIUM BROMATE: THE REACTION IS VIOLENTLY EXPLOSIVE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-182] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

BURNING SELENIUM IN OXYGEN HAS RESULTED IN EXPLOSION, PROBABLY DUE TO THE PRESENCE OF ORGANIC MATTER. SILVER BROMATE + SELENIUM: REACTION IS VIOLENTLY EXPLOSIVE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-182] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

NITROGEN TRICHLORIDE EXPLODES ON CONTACT WITH SELENIUM. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-141] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Acids, strong oxidizers, chromium trioxide, potassium bromate, cadmium. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 276] **QC REVIEWED**

DECOMPOSITION NO DATA

REACTS VIOLENTLY WITH CHROMIUM TRIOXIDE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-181] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Can react violently with ... chromic oxide (CrO3), ... lithium silicon (Li6Si2), ... nitric acid, ... nitrogen trichloride, oxygen, ... potassium bromate, ... silver bromate. ... [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2390] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

SELENIUM BURNS IN AIR WITH A BRIGHT BLUE FLAME & EMITS A HORSERADISH LIKE ODOR. [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 2130] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

SELENIUM UNITES DIRECTLY WITH FLUORINE IN THE COLD, GIVING OFF FUMES, & FINALLY THE SELENIUM IGNITES. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-181] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

BROMINE PENTAFLUORIDE REACTS READILY IN THE COLD WITH SELENIUM; IGNITION USUALLY OCCURS. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-26] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

A MIXTURE OF POTASSIUM & SELENIUM IGNITES; SODIUM DOES LIKEWISE & IS ATTENDED BY VIVID INCANDESCENCE. RUBIDIUM CARBIDE BURNS IN SELENIUM VAPOR. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-182] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

A MIXTURE OF BARIUM CARBIDE AND SELENIUM HEATED TO 150 DEG C BECOMES INCANDESCENT. CALCIUM CARBIDE AND SELENIUM VAPOR REACT WITH INCANDESCENCE. A MIXTURE OF SELENIUM AND ANY CHLORATES BUT THE ALKALI CHLORATES BECOMES INCANDESCENT. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-181] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

STRONTIUM CARBIDE MIXED WITH SELENIUM & HEATED TO 500 DEG C BECOMES INCANDESCENT. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-204] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

LITHIUM SILICIDE ATTACKS SELENIUM WITH INCANDESCENCE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-161] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA

FIRE FIGHTING PROCEDURES

Extinguishant: For selenium, water [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Hazardous decomposition products: Toxic gases and vapors may be released in a fire involving selenium. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

When heated to decomp it emits toxic fumes of selenium. /Colloidal selenium/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2390] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA

REACTIVITIES & INCOMPATIBILITIES

Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading . Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials

1 - HSDB

NAME OF SUBSTANCE SELENIUM

CAS REGISTRY NUMBER 7782-49-2

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-152] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-152] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. /Selenium powder/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-152] Hazardous Materials/Dangerous Goods Incident. U.S. Department of

informed of coal tar pitch volatiles' hazardous properties. Non-impervious clothing which becomes contaminated with coal tar pitch volatiles should be removed immediately and not reworn until the coal tar pitch volatiles are removed from the clothing. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If the use of respirators is necessary, the only respirators permitted are those that have been approved by the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration) or by the National Institute for Occupational Safety and Health. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

In addition to respirator selection, a complete respiratory protection program should be instituted which includes regular training, maintenance, inspection, cleaning, and evaluation. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with /coal tar pitch volatiles/. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Wash hands before eating or smoking and at the close of a work shift. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respirator Selection: Greater than any detectable concn: Any self-contained breathing apparatus with a full facepiece and operated in a pressure-demand or other positive pressure mode; or any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. Escape: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister having a high-efficiency particulate filter, or any appropriate escape-type self-contained breathing apparatus. /Coal tar pitch volatiles/ [NIOSH. Pocket Guide to Chemical Hazards. 5th Printing/Revision. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services,, p. 85] NIOSH/Supt. of Documents, GPO, Sept. 1985., p. 85] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Areas in which exposure to coal tar pitch volatiles may occur should be identified by signs or other appropriate means, and access to these areas should be limited to authorized persons. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Workers subject to skin contact with coal tar pitch volatiles should wash with soap or mild detergent and water any areas of the body which may have contacted coal tar pitch volatiles at the end of each work day. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees who handle coal tar pitch volatiles should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Clothing contaminated with coal tar pitch volatiles should be placed in closed containers for storage until it can be discarded or until provision is made for the removal of coal tar pitch volatiles from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the coal tar pitch volatiles, the person performing the operation should be

1 - HSDB

NAME OF SUBSTANCE PYRENE

CAS REGISTRY NUMBER 129-00-0

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

Fire Fighting: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguishant: Foam, dry chemical, and carbon dioxide /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION

When heated to decomposition it emits acrid smoke & fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2324] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

A skin irritant. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2324] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face-shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with coal tar pitch volatiles. Employees should be provided with and required to use splash-proof goggles where there is any possibility of liquid coal tar volatiles contacting the eyes. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 204] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3152-2 (1988)] **QC REVIEWED**

STORAGE CONDITIONS NO DATA

CLEANUP METHODS NO DATA

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for n-propyl benzene: concentration process: biological treatment. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-47 (1982)] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

Protection Association, 1986. 325M-82] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 3. 3= Liquids which can be ignited under almost all normal temp conditions. Water may be ineffective on these liq because of their low flash points. Solids which form coarse dusts, solids in shredded or fibrous form that create flash fires, solids that burn rapidly, usually because they contain their own oxygen, and any material that ignites spontaneously at normal temp in air. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-82] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which are normally stable even under fire exposure conditions, and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-82] **PEER REVIEWED**

FLAMMABLE LIMITS

0.8-6% [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 3257] **PEER REVIEWED**

FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

... IRRITATING TO MUCOUS MEMBRANES, EYES, NOSE, THROAT & SKIN. [National Research Council. Drinking Water & Health Volume 1. Washington, DC: National Academy Press, 1977., p. 761] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING	NO DATA
OTHER PREVENTIVE MEASURES	NO DATA
STABILITY/SHELF LIFE	NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

FIRE POTENTIAL

Moderate fire risk [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987., p. 972] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 2. 2= Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire

Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 300 meters (1000 feet). Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Large fires: Water spray, fog or alcohol-resistant foam. Do not use straight streams. Move containers from fire area if you can do it without risk. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of

1 - HSDB

NAME OF SUBSTANCE N-PROPYLBENZENE

CAS REGISTRY NUMBER 103-65-1

HAZARDS SUMMARY

The major hazards encountered in the use and handling of n-propylbenzene stem from its toxicologic properties and flammability. Toxic by all routes (ie, inhalation, ingestion, dermal contact), exposure to this colorless liquid may occur from its use in textile dyeing and printing, as a solvent for cellulose acetate, and in the manufacture of methylstyrene. Effects from exposure may include burns to the skin and eyes, nausea, headache, dizziness, central nervous system depression, and unconsciousness. In activities and situations where over-exposure may occur, wear a positive pressure self-contained breathing apparatus and protective clothing. If contact should occur, immediately irrigate exposed eyes with copious amounts of tepid water for at least 15 minutes, and wash exposed skin thoroughly with soap and water. Contaminated clothing should be removed and left at the site. This substance is flammable and may be ignited by heat, sparks, or flames. Its heavier-than-air vapor may travel to a source of ignition and flash back, or accumulate to explosive concentrations in enclosed spaces, such as sewers. Also, containers of n-propylbenzene may explode in the heat of a fire. For fires involving this substance, extinguish with dry chemical, CO2, water spray, fog, or alcohol-resistant foam. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in the fire. For small spills of n-propylbenzene, take up with sand or other noncombustible absorbent, and place into container for later disposal. Dike far ahead of large spills to contain for later disposal. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-127] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-127] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-127] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Inhalation or contact with material may irritate or burn skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control may cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial

apparatus. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with /coal tar pitch volatiles/. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses

Office, Jan. 1981., p. 3] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

CAN REACT WITH OXIDIZING MATERIALS [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Rheinhold, 1979., p. 896] **PEER REVIEWED**

DECOMPOSITION

When heated to decomposition it emits acrid smoke & fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2154] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

CAN CAUSE PHOTOSENSITIZATION OF SKIN. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 1037] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

/When handling phenanthrene/ wear rubber gloves, face shield, coveralls, and all-purpose canister mask. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 404] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for coal tar pitch volatiles is as follows: Particulate concentration of 2 mg/cu m or less: A chemical cartridge respirator with an organic vapor cartridge(s) and with a fume or high efficiency, or any supplied-air respirator, or any self-contained breathing apparatus. 10 mg/cu m or less: A chemical cartridge respirator with a full facepiece and an organic vapor cartridge(s) and with a fume or high-efficiency filter, or gas mask with a chin-style or a front- or back-mounted organic vapor canister and with a full facepiece and a fume or high-efficiency filter, or any supplied-air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece. 200 mg/cu m or less: A type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode, a powered air-purifying respirator with an organic vapor cartridge and a high-efficiency particulate filter. 400 mg/cu m or less: A type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet, or hood operated in continuous-flow mode. Greater than 400 mg/cu m or entry and escape from unknown concentrations: A combination respirator which includes a type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode. Escape: Any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class, any escape self-contained breathing

1 - HSDB

NAME OF SUBSTANCE PHENANTHRENE

CAS REGISTRY NUMBER 85-01-8

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

SLIGHT, WHEN EXPOSED TO HEAT OR FLAME. ... [Weast, R.C. (ed.). Handbook of Chemistry and Physics. 60th ed. Boca Raton, Florida: CRC Press Inc., 1979., p. 896] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it goes below the surface of the liquid and turns to steam. However, water fog gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-78] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity 0. 0= Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-78] **PEER REVIEWED**

FLAMMABLE LIMITS NO DATA

FLASH POINT

171 deg C (340 deg F) open cup [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-98] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

WATER, FOAM, CARBON DIOXIDE OR DRY CHEM. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2154] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Water or foam may cause frothing. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 7th ed. Boston, Mass.: National Fire Protection Association, 1978. 325M-157] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Fire fighting: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 6] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 6] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguishant: Foam, dry chemical, and carbon dioxide. /Coal tar pitch volatiles/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing

this step, the charcoal is regenerated by controlled oxidation in a rotary kiln incinerator installation (600-900 deg C). The escaping hydrogen chloride gas is removed by scrubbers. Concentrated wastes are destroyed in special waste incinerators which have suitable installations to scrub the liberated hydrogen chloride gas. Recommendable method: Incineration. Not recommendable methods: Discharge to sewer, open burning & use as fuel. Peer-review: Dissolve in excess solvent before burning. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 227] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

(1991)] **PEER REVIEWED**

DISPOSAL METHODS

Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste numbers D037;F027 must conform with USEPA regulations in storage, transportation, treatment and disposal of waste. [40 CFR 240-280, 300-306, 702-799 (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

Pentachlorophenol is a waste chemical stream constituent which may be subjected to ultimate disposal by controlled incineration. Incineration (600 deg to 900 deg) coupled with adequate scrubbing and ash disposal facilities. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.2-8 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

A potential candidate for rotary kiln incineration at a temperature range of 820 to 1,600 deg C and residence times of seconds for liquids and gases, and hours for solids. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-10 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for pentachlorophenol: Concentration process: Biological Treatment. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-61 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technologies have been investigated for pentachlorophenol: Concentration process: Solvent Extraction. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-121 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165.9 (a) (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

Group II Containers: Non-combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to a scrap metal facility for recycling, disposal or burial in a designated landfill. /Organic or metallo-organic pesticides/ [40 CFR 165.9 (b) (7/1/90)] **PEER REVIEWED**

DISPOSAL METHODS

Before draining, aqueous soln of low concn must be purified of the poisonous pentachlorophenol by filtering methods such as adsorption of the harmful material by activated charcoal. After

when the pentachlorophenol exists almost entirely in ionic form in aqueous solution, and is enhanced at low pH when the percentage of molecular species (whose concentration can be determined from pKa value) becomes significant. These remarks and the adsorptive capacities (163 mg.g-1 = 0.6 mmol/g at pH = 5.2 and 79 mg/g = 0,3 mmol/g at pH = 12.7), suggest a negative interaction between pentachlorophenol and activated carbon which seems to be confirmed by the results with bentone SD-43 (tables 1 to 4), and the values of the electrokinetic potential of these materials. This study emphasizes the effect of organic coadsorbates (eg, dissolved humic substances and the pesticide lindane) on the adsorption capacity of activated carbon for pentachlorophenol. Two different natural organic matters were studied as coadsorbates: purified humic acids from a commercial source (at 10 mg/l) and fulvic acids extracted from a top soil horizon (at 20 mg/l). Pentachlorophenol absorption was not affected by humic acids, whereas an increase of adsorption seemed to be observed in the presence of fulvic acids. Pentachlorophenol does not affect the adsorption of the humic acids, but improves slightly the removal of fulvic acids. This suggests an association between the two kinds of organic compounds, the resulting complex, fulvic acids/pentachlorophenol, being more adsorbed than the compounds themselves. The coadsorbate lindane (0.65 mg/l) which is easily adsorbed by activated carbon seemed also to improve slightly the removal efficiency of pentachlorophenol by activated carbon. [Fabre B et al; Rev Sci Eau 3 (3): 277-92 (1990)] **PEER REVIEWED**

CLEANUP METHODS

Chemical analyses revealed that polycyclic aromatic hydrocarbons and other organic compounds were present in a perennial freshwater stream that flowed through the abandoned American Creosote works and into Pensacola Bay, Florida. Moreover, groundwater pumped from a well depth of 21 m at a location adjacent to the site was heavily contaminated with polycyclic aromatic hydrocarbons and other organics. A study was conducted to determine the efficacy of ultrafiltration for removal of organics from groundwater at this USEPA, Super Fund site. Ultrafiltration reduced the concentration of total identified organics from 210.0 mg/l in groundwater to 1.5 mg/l in the post filtration permeate. Tests for toxicity/teratogenicity in embryonic inland silversides, Menidia beryllina; and Microtox 15 min EC50's were conducted with: (1) streamwater, (2) untreated groundwater, (3) feedwater used in the ultrafiltration system and (4) permeate water that passed through the ultrafiltration system. Concentration of 100% streamwater caused significant (alpha : 0.05) teratogenic responses in fish embryos and larvae; the Microtox EC50 was 3.7% streamwater. Groundwater and feedwater caused significant embryo toxic or teratogenic responses at concentrations of 100, 10, and 1%; the Microtox EC50's were 0.85 and 0.48%, respectively. In contrast, only 100% permeate water caused significant increases in terata, compared to the control response; at 10 and 1% concentration > 90% of hatched larvae appeared normal. The Microtox EC50 was 30% permeate water. [Middaugh DP et al; Arch Environ Contam Toxicol 21 (2): 233-44

Publishing Co., 1987. C-194] **PEER REVIEWED**

CLEANUP METHODS

1) VENTILATE AREA OF SPILL. 2) COLLECT SPILLED MATERIAL IN MOST CONVENIENT & SAFE MANNER & DEPOSIT IN SEALED CONTAINERS FOR RECLAMATION OR ... DISPOSAL ... LIQ CONTAINING PENTACHLOROPHENOL SHOULD BE ABSORBED IN VERMICULITE, DRY SAND, EARTH OR SIMILAR MATERIAL. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

CLEANUP METHODS

Biological treatment is principal secondary treatment method but other ... methods employed at some wood preservative plants are carbon absorption, membrane filtration ... and oxidation by chlorine, hydrogen peroxide, and ozone. The reduction in concn of pentachlorophenol ... /in biological treatment/ is thought to occur by adsorption upon biomass rather than by degradation. [Parr, J.F., P.B. Marsh, and J.M. Kla (eds.). Land Treatment of Hazardous Wastes. Park Ridge, New Jersey: Noyes Data Corporation, 1983., p. 400] **PEER REVIEWED**

CLEANUP METHODS

Avoid contact with solid and dust. Keep people away. Stop discharge if possible. Isolate and remove discharged material. Notify local health and pollution control agencies. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

CLEANUP METHODS

Survey report six case histories employing EPA's hazardous materials spills treatment trailer are reviewed. The trailer's ... treatment system has three mixed-media filters and three activated carbon columns to remove suspended, precipitated, and organic soluble materials. Spills of PCB, pentachlorophenol, kepone, tremide (chlordane, heptachlor, aldrin, and dieldrin), toxaphene, and dinitrobutylphenol were treated by the EPA trailer, which was generally successful in mitigating environmental effects by filtering and carbon-adsorption. 90% removal was achieved for 21 of 23 compounds. [Lafornara JP; WPCF J 50 (4): 617 (1978)] **PEER REVIEWED**

CLEANUP METHODS

Adsorption studies for the removal of the pesticide pentachlorophenol found in a number of water supplies were carried out using various materials including kaolinite, bentone SD-3 and powdered activated carbon. It was found that adsorption on kaolinite was negligible, whereas bentone SD-3 presented and adsorption efficiency from 10 to 100 fold less than equivalent quantities of powdered activated carbon. The effect of the pH on the removal of pentachlorophenol by activated carbon was studied. The removal efficiency of pentachlorophenol by activated carbon is better in acidic media. A clear dependence of adsorption on the pH appeared to be the result of a marked variation on the pesticide solubility as a function of the pH. Adsorption of pentachlorophenol/phenate (5 mg/l) diminishes markedly at pH values above the pKa of this weak acid (equal to 5.9 : 0.1)

Research on Cancer, V20 304 (1979)] 1972-PRESENT. (Multivolume work). V20 304 (1979)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 189] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6101, 3097-1, 6193, 6194, 6195 (1988)] **QC REVIEWED**

STORAGE CONDITIONS

Temperature: ambient. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

STORAGE CONDITIONS

Venting: open. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

STORAGE CONDITIONS

Store in cool, dry, well ventilated location. Separate from acids, alkalies, oxidizing materials, and other organic materials. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

STORAGE CONDITIONS

Penta Ready, Penta WR: Keep container closed. Do not leave in sunshine. Do not use, pour, spill, or store near heat or open flame. Destroy or return this container when empty. Do not reuse empty container. [Farm Chemicals Handbook 87. Willoughby, Ohio: Meister Publishing Co., 1987. C-194] **PEER REVIEWED**

STORAGE CONDITIONS

Penta Concentrate: Not for use or storage around the house. [Farm Chemicals Handbook 87. Willoughby, Ohio: Meister

Environmental considerations: Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates or greater concentration. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 528] Hazardous Materials Systems (BOE), 1987., p. 528] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. Contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE

STABLE; PROLONGED HEATING ABOVE 200 DEG C PRODUCES TRACES OF OCTACHLORODIBENZO-PARA-DIOXIN. [IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for

constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

ALL CLOTHING WORN DURING ONE SPRAYING OPERATION SHOULD BE LEFT AT WORKPLACE & LAUNDERED BEFORE REUSE. WASHING WITH SOAP & WATER IS MUST BEFORE EATING, DRINKING OR SMOKING. AT END OF EACH DAY, WORKMEN SHOULD SHOWER & CHANGE INTO CLEAN CLOTHING. [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 2611] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Penta Concentrate: Vapor will cause injury if adequate ventilation is not insured. Do not use this product indoors or any other confined areas where vapors may concentrate ... [Farm Chemicals Handbook 87. Willoughby, Ohio: Meister Publishing Co., 1987. C-244] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 174] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If material not on fire and not involved in fire: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 528] Hazardous Materials Systems (BOE), 1987., p. 528] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Avoid breathing vapors. Keep upwind. Wear boots, protective gloves, and goggles. Wash away any material which may have contacted the body with copious amounts of water or soap and water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 528] Hazardous Materials Systems (BOE), 1987., p. 528] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Environmental considerations: Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be contained with a flexible impermeable membrane liner./ Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 528] Hazardous Materials Systems (BOE), 1987., p. 528] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. May require eye protection. Any supplied-air respirator. May require eye protection. Any self-contained breathing apparatus with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 232] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Emergency or planned entry into unknown concn or IDLH conditions: Respirator Classes: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator that has a full face piece and is operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Escape from suddenly occuring respiratory hazards: Respirator Classes: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

Odor thresholds for PCP soln at 30 deg and 60 deg C were 857 and 12,000 ug/l, respectively. [USEPA; Ambient Water Quality Criteria Doc: Pentachlorophenol p.C-32 (1980) EPA 440/5-80-065] **PEER REVIEWED**

ODOR THRESHOLD

Detection: 1.6 mg/l. [Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983., p. 954] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Dust or vapor irritates skin. ... [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Eye and skin irritant. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

All chlorophenol ... dusts are ... irritating to the respiratory tract. /Chlorophenols/ [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. 5(81) 869] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Excessively treated interior surfaces may be a source of exposure sufficient to cause irritation of eyes, nose, and throat. [Morgan DP; Recognition and Management of Pesticide Poisonings. 4th ed. p.73 EPA 540/9-88-001. Washington, DC: U.S. Government Printing Office, March 1989] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear rubber gloves ... & overalls. [ITII. Toxic and Hazardous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1988., p. 399] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Five commercial glove materials were tested for permeation using two pentachlorophenol (PCP) formulations. When challenged with a 4.3% PCP in diesel oil soln, both Dayton Flexible Products Triflex (PVC) & the Best 64 NFW (natural rubber) gloves exhibited breakthrough times 30 sec after exposure. The Playtex #835 (latex/neoprene) glove exhibited breakthrough after 60 min, but showed a 5-fold greater rate of permeation than the Dayton & the Best glove. Neither the Edmont Sol-Vet (nitrile rubber) not the Granet Glo-Gluv (PVC) gloves had been permeated after testing for 8 & 16 hr, respectively. ... The results show that different gloves offer differing resistance to permeation by PCP based upon the composition of the gloves & the PCP formulation tested. [Silkowski JB et al; Am Ind Hyg Assoc J 45 (8): 501-4 (1984)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 2.5 mg/cu m: Respirator Classes: Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. May require eye protection. Any

in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 528] Hazardous Materials Systems (BOE), 1987., p. 528] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguish fire using agent suitable for surrounding fire. Use dry chemical, foam, carbon dioxide, or water spray. Water may be ineffective. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Use water spray to keep fire-exposed containers cool. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Hydrogen chloride, chlorinated phenols, and carbon monoxide may be released upon decomposition. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

Contact with strong oxidizers may cause fires or explosions. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Reacts with acids, alkalies, oxidizing materials, and other organic materials. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, acids, alkalis. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 242] **QC REVIEWED**

DECOMPOSITION

Hydrogen chloride, chlorinated phenols, and carbon monoxide may be released upon decomposition. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

DECOMPOSITION

Decomposes to produce hydrogen chloride and other irritants and toxic gases. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

POLYMERIZATION NO DATA

(1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION

Health: 3. 3= Materials that, on short exposure, could cause serious temporary or residual injury, including those requiring protection from all bodily contact. Fire fighters may enter the area only if they are protected from all contact with the material. 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. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 0. 0= Includes any material that will not burn. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-133] **PEER REVIEWED**

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

If material on fire or involved in fire: Extinguish fire using agent suitable for type of surrounding fire. Material itself does not burn or burns with difficulty. [Association of American Railroads. Emergency Handling of Hazardous Materials

During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C.

1 - HSDB

NAME OF SUBSTANCE PENTACHLOROPHENOL

CAS REGISTRY NUMBER 87-86-5

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: TOXIC, inhalation, ingestion, or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.). Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-154] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-154] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-154] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY, it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders

is an incidence of point source emmissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contact lenses should not be worn when working with this chemical. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 187] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic

Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983., p. 919] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Dust: irritating to eyes, nose & throat; ... solid: irritating to skin & eyes [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

BUTYL RUBBER GLOVES; SIDE-SHIELD SAFETY GLASSES; DUST MASK OR SELF-CONTAINED BREATHING APPARATUS [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

WEAR FULL PROTECTIVE CLOTHING. IN ABSENCE OF HEAT, SELF-CONTAINED BREATHING APPARATUS IS NOT REQUIRED. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-69] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Keep sparks, flames, and other sources of ignition away; Keep material out of water sources and sewers; Build dikes to contain flow as necessary. /Nitrophenols/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 499] Hazardous Materials Systems (BOE), 1987., p. 499] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Avoid breathing vapors or dusts; 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. /Nitrophenols/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 499] Hazardous Materials Systems (BOE), 1987., p. 499] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

... Clean work clothes should be supplied daily; showers should be taken prior to changing to street clothes. ... Appropriate type respirators with organic vapor canisters should be provided in areas of concn of dust or vapors. /Nitrophenols/ [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 664] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. All contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Local exhaust ventilation should be applied wherever there

Association, 1986. 49-69] **PEER REVIEWED**

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

USE WATER TO COOL CONTAINERS EXPOSED TO FIRE. IF CONTAINERS ARE DAMAGED, WET DOWN EXPOSED P-NITROPHENOL. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-69] **QC REVIEWED**

FIRE FIGHTING PROCEDURES

Do not extinguish fire unless flow can be stopped. Use water in flooding quantities. Apply water from as far a distance as possible; solid streams of water may be ineffective. Use "alcohol" foam, carbon dioxide, or dry chemical. Wear self-contained breathing apparatus when fighting fires involving this material. /Nitrophenol/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 499] Hazardous Materials Systems (BOE), 1987., p. 499] **QC REVIEWED**

TOXIC COMBUSTION PRODUCTS

Toxic oxides of nitrogen are produced during combustion. /Nitrophenol/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 499] Hazardous Materials Systems (BOE), 1987., p. 499] **QC REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION

DECOMPOSES VIOLENTLY @ 279 DEG C ... [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

DECOMPOSITION

When heated to decomp, it emits toxic fumes of /nitrogen oxides./ [Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2455] **QC REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

58.3 MG/L [National Research Council. Drinking Water & Health, Volume 4. Washington, DC: National Academy Press, 1981., p. 230] **QC REVIEWED**

ODOR THRESHOLD

Detection in air: 2.3 mg/cu m [Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983., p. 919] **PEER REVIEWED**

ODOR THRESHOLD

Detection in water: 2.5 mg/l [Verschueren, K. Handbook of

In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

FIRE POTENTIAL

... Will burn even in absence of air. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FIRE POTENTIAL

AROMATIC NITROCOMPOUNDS ARE FLAMMABLE ... /AROMATIC NITROCMPD/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1451] **QC REVIEWED**

FIRE POTENTIAL

Nitrophenol is combustible though it may take some effort to ignite. /Nitrophenol/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 499] Hazardous Materials Systems (BOE), 1987., p. 499] **QC REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 3. 3= Materials extremely hazardous to health, but areas may be entered with extreme care. Full protective clothing, incl self-contained breathing apparatus, rubber gloves, boots and bands around legs, arms and waist should be provided. No skin surface should be exposed. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-69] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing of liquids ... if it gets below the surface of the liquid and turns to steam. ... Water spray gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-69] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection

non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINER. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes.

and/or toxic and cause pollution. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. When heated, vapors may form explosive mixtures with air: indoors, outdoors, and sewers explosion hazards. Some may polymerize (P) explosively when heated or involved in a fire. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. /Nitrophenols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For

1 - HSDB

NAME OF SUBSTANCE 4-NITROPHENOL

CAS REGISTRY NUMBER 100-02-7

HAZARDS SUMMARY

The major hazards encountered in the use and handling of 4-nitrophenol stem from its toxicologic properties. Toxic by all routes (ie, inhalation, ingestion, dermal absorption), exposure to this odorless, colorless to yellow, crystalline substance, may occur from its use as a fungicide for leather products, or as a chemical intermediate in the syntheses of methyl and ethyl parathion. Effects from exposure may include burns to the skin and eyes, headache, dizziness, shock, unconsciousness, and death from cardiac or pulmonary failure. Contact with 4-nitrophenolshould be protected against by wearing butyl rubber gloves, boots, chemical protective clothing which is specifically recommended by the shipper or producer, and a dust mask, organic vapor canister respirator, or in emergency situations, a self-contained breathing apparatus. If contact does occur, immediately flush affected skin or eyes with running water for at least 15 minutes, and remove and isolate contaminated clothing at the site. While 4-nitrophenol does not ignite easily, it can burn, emitting toxic oxides of nitrogen. Also, containers may explode in the heat of a fire. For small fires involving 4-nitrophenol, extinguish with dry chemical, CO2, Halon, water spray, or standard foam, and for large fires, use water spray, fog, or standard foam. Runoff from fire control water may give off poisonous gases or cause pollution, and should be controlled by diking, as necessary. 4-Nitrophenol should be stored in a cool, ventilated, fireproofed area, away from oxidizing agents, oxidiazable materials, and sources of ignition and physical damage. 4-Nitrophenol may be shipped via air, rail, road, or water in containers bearing the label, "Keep Away From Food". Small spills of 4-nitrophenol may be taken up (if liquid, with sand or other noncombustible absorbent) and placed into containers for later disposal. Large spills should be contained in pits, or other holding areas that are sealed with an impermeable flexible membrane liner. Solids should be covered with a plastic sheet. Liquids should be neutralized wih slaked lime, crushed limestone, or sodium bicarbonate, and diked, if necessary, to prevent runoff from entering water sources or sewers. Spills of 4-nitrophenol in water may need to be trapped at the bottom with sand bag barriers, activated charcoal applied, and the trapped material removed with suction hoses, mechanical dredges, or lifts. Prior to implementing permanent land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance. Also, 4-nitrophenol is a potential candidate for rotary kiln or fluidized bed forms of incineration. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Health: TOXIC; inhalation, ingestion, or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive

other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees should wash immediately with soap when skin is wet or contaminated & daily at the end of each work shift. Work clothing should be changed daily if ... contaminated. Remove non-impervious clothing immediately if wet or contaminated. Provide emergency showers. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 651] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or

readiliy available, whereas in others, the availability of water from a sink or hose could be considered adequate.) [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 30 mg/cu m. Respirator Class(es): Any supplied-air respirator. Substance reported to cause eye irritation or damage; may require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 75 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. Substance reported to cause eye irritation or damage; may require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 150 mg/cu m. Respirator Class(es): Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards. Respirator Class(es): Any air-purfying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister in combination with a dust, mist, and fume filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concentrations of IDLH conditions. Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 300 mg/cu m. Respirator Class(es): Any supplied-air respirator with a full facepiece and operated in a pressure-demand or

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face-shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent any possibility of skin contact with solid 4-nitroaniline or liquids containing 4-nitroaniline. Employees should be provided with and required to use dust and splash-proof safety goggles where there is any possibility of liquid 4-nitroaniline or solids containing 4-nitroaniline contacting the eyes. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

The following types of respirators should be selected under the prescribed concentrations: 30 mg/cu m: 1) Any supplied-air respirator 2) Any self-contained breathing apparatus. 75 mg/cu m: Any supplied-air respirator operated in a continuous flow mode. 150 mg/cu m: 1) Any self-contained breathing apparatus with full facepiece 2) Any supplied-air respirator with a full facepiece. 300 mg/cu m: Any supplied-air respirator with a half-mask and operated in a pressure-demand or other positive pressure mode. Emergency or planned entry in unknown concentration or immediately dangerous to life or health (IDLH) conditions: 1) Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode 2) Any supplied-air respirator with a full face piece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. Pocket Guide to Chemical Hazards. 5th Printing/Revision. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services,, p. 175] NIOSH/Supt. of Documents, GPO, Sept. 1985., p. 175] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. (Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be

followed by depressuring to vent ammonia), complete conversion to sodium 4-nitrophenoxide occurred. ... /When/ separated by centrifuging, it was then heated to dry ... when it decomposed violently & was ejected through the vessel opening. ... Some of the tautomeric aci-nitroquinonoid salt may have been produced during the drying operation. [Bretherick, L. Handbook of Reactive Chemical Hazards. 4th ed. Boston, MA: Butterworth-Heinemann Ltd., 1990, p. 586] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Incompatible with reducers. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 650] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Incompatabilities: Strong oxidizers and moisture may result in spontaneous heating. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

FORMS WATER SOL SALTS WITH MINERAL ACIDS. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 945] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, strong reducers, (Note: May result in spontaneous heating of organic materials in the presence of moisture.) [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 226] **PEER REVIEWED**

DECOMPOSITION

May decompose explosively in a fire. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 49-124] **PEER REVIEWED**

DECOMPOSITION

When heated to decomp it emits toxic /nitrogen oxides./ [Lewis, R.J. Sax's Dangerous Properties of Industrial Materials. 9th ed. Volumes 1-3. New York, NY: Van Nostrand Reinhold, 1996., p. 2424] **QC REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

Eye Irritation Level: ... Is mildly irritating to the eyes and may cause some corneal damage. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Dust: irritating to eyes, nose and throat; solid: irritating to skin & eyes [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

ignition will occur, such as class IIIB combustible liquids and solids and semi-solids whose flash point exceeds 200 deg F (93.4 deg C), as well as most ordinary combustible materials. Water may cause frothing if it sinks below the surface of the burning liquid and turns to steam. However, a water fog that is gently applied to the surface of the liquid will cause a frothing which will extinguish the fire. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-74] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 3. 3= Includes materials that, in themselves, are capable of detonation, explosive decomposition, or explosive reaction, but which require a strong initiating source or heating under confinement. This includes materials that are sensitive to thermal and mechanical shock at elevated temperatures and pressures and materials that react explosively with water. Fires involving these materials should be fought from a protected location. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-74] **PEER REVIEWED**

FLAMMABLE LIMITS NO DATA

FLASH POINT

329 DEG F (OPEN CUP) (MOLTEN SOLID) [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FLASH POINT

199 deg C (closed cup) [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

180 deg C (356 deg F) [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES NO DATA

TOXIC COMBUSTION PRODUCTS

Toxic oxides of nitrogen may form in fire. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

An ammonical soln of 4-nitroaniline containing ammonium chloride was being treated with 50% sodium hydroxide soln to displace ammonia. In error, double the amt required to give usual 10% of free alkali was added, & during subsequent degassing operation (heating to 130 deg C under pressure,

and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

FIRE POTENTIAL

Combustible when exposed to heat or flame. [DANGER PROPS INDUS MATER 8TH ED 1992] **PEER REVIEWED**

FIRE POTENTIAL

COMBUSTIBLE. IN PRESENCE OF MOISTURE CAUSES NITRATION OF ORG MATERIALS & MAY RESULT IN SPONTANEOUS IGNITION. [Weast, R.C. (ed.) Handbook of Chemistry and Physics. 67th ed. Boca Raton, FL: CRC Press, Inc., 1986-87. 49-67] **PEER REVIEWED**

FIRE POTENTIAL

Process errors led to discharge of copious amt of nitrous fumes into glass reinforced plastic ventilation duct above diazotization vessel. On 2 occasions fires were caused in the duct by vigorous reaction of the dinitrogen tetraoxide with nitroaniline dusts in the duct. [Bretherick, L. Handbook of Reactive Chemical Hazards. 4th ed. Boston, MA: Butterworth-Heinemann Ltd., 1990, p. 1354] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 3. 3= Materials that, on short exposure, could cause serious temporary or residual injury, including those requiring protection from all bodily contact. Fire fighters may enter the area only if they are protected from all contact with the material. Full protective clothing, incl self-contained breathing apparatus, coat, pants, gloves, boots and bands around legs, arms and waist should be provided. No skin surface should be exposed. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-74] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before

/Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINER. /Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research

1 - HSDB

NAME OF SUBSTANCE 4-NITROANILINE

CAS REGISTRY NUMBER 100-01-6

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: TOXIC; inhalation, ingestion, or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. When heated, vapors may form explosive mixtures with air: indoors, outdoors, and sewers explosion hazards. Some may polymerize (P) explosively when heated or involved in a fire. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. /Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. /Nitroanilines/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations.

OTHER PREVENTIVE MEASURES

Eating and smoking should not be permitted in areas where liquid naphthalene is handled, processed, or stored. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If an employees' clothing becomes contaminated with solid naphthalene, employees should change into uncontaminated clothing before leaving the work area. Clothing contaminated with naphthalene should be placed into closed containers for storage until it can be discarded or until provision is made for the removal of the naphthalene from the clothing. If the clothing is to be laundered or cleaned to remove the naphthalene, the person performing the operation should be informed of naphthalene's hazardous properties. Non-impervious clothing which becomes contaminated with naphthalene should be removed promptly and not reworn until the naphthalene is removed from the clothing. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Class(es): Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 220] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 220] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 220] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 159] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Heat only in specifically-designed lamps. /Moth repellents/ [Worthing, C.R., S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 7th ed. Lavenham, Suffolk, Great Britain: The Lavenham Press Limited, 1983., p. 390] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Skin that becomes contaminated with liquid naphthalene should be immediately washed or showered with soap or mild detergent and water to remove any naphthalene. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

any possibility of skin contact with naphthalene. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

/IN/ EXPOSURE OF WORKMEN TO HIGH NAPHTHALENE CONCN, THE USE OF RESP PROTECTIVE EQUIPMENT & CHEM-TYPE PLASTIC GOGGLES IS ESSENTIAL. PLASTIC FOOTWEAR & HANDWEAR MAY BE REQUIRED TO PROTECT SKIN. EMERGENCY SHOWERS & EYE FOUNTAINS SHOULD BE INSTALLED AT WORKPLACES WHERE THERE IS A DANGER OF EYE OR SKIN CONTAMINATION. SAFETY CLOTHING INCL APRONS & FACE SHIELDS ARE A NECESSARY PRECAUTION FOR PERSONS HANDLING LIQUID NAPHTHALENE THAT MAY COME IN CONTACT WITH WATER. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1425] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 100 ppm. Respirator Class(es): Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter. May require eye protection. Any supplied-air respirator. May require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 220] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 250 ppm. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. May require eye protection. Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter. Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter. May require eye protection. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 220] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 220] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator

and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

ODOR THRESHOLD

Odor threshold (water) 0.021 mg/l (w/v); odor threshold (air) 0.084 ppm (v/v) [USEPA/ODW; Drinking Water Health Advisories for 15 Volatile Organic Chemicals p.I-1 (1990)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Irritating to skin ... does occur. Vapors can cause eye irritation at concn of 15 ppm in air. ... [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. V15 713 (1981)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Upon direct skin contact, naphthalene is a primary irritant. [USEPA/ODW; Drinking Water Health Advisories for 15 Volatile Organic Chemicals p. I-7 (1990) NTIS No. PB90-259821] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

USA BUREAU OF MINES APPROVED ORGANIC VAPOR CANISTER UNIT (USBM TYPE B), RUBBER GLOVES, CHEMICAL SAFETY GOGGLES; FACE SHIELD, COVERALLS &/OR RUBBER APRON, RUBBER SHOES OR BOOTS. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for napthalene: Minimum respiratory protection required above 10 ppm: Particulate and vapor concentration: 500 ppm or less: Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a dust filter, or gas mask with an organic vapor canister (chin-style front- or back-mounted canister) with a dust filter, or any supplied-air respirator with a full facepiece, helmet, or hood, or any self-contained breathing apparatus with a full facepiece. Greater than 500 ppm or entry and escape from unknown concentrations: Any self-contained breathing apparatus with a full facepiece and operated in a pressure-demand or other positive pressure mode, or a combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxillary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode; Escape: Any gas mask providing protection against organic vapors and particulates, or any escape self-contained breathing apparatus. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face-shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent

FOAMING. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-66] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

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. 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. [Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p. 36 (1981)] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Toxic gases and vapors (such as dense acrid smoke and carbon monoxide) may be released in a fire involving naphthalene. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS

Molten naphthalene spatters and foams in contact with water. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

MODERATE, IN FORM OF DUST, WHEN EXPOSED TO HEAT OR FLAME. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1971] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

VAPOR FORMS EXPLOSIVE MIXTURES WITH AIR. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-66] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

NAPHTHALENE ... WILL REACT VIOLENTLY WITH CHROMIC ANHYDRIDE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491-65] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, chromic anhydride. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 220] **QC REVIEWED**

DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA

ODOR THRESHOLD

Odor detection in water 6.80 ppm (purity not specified) [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 113] **PEER REVIEWED**

ODOR THRESHOLD

At least as low as 0.3 ppm. [Mackison, F. W., R. S. Stricoff,

Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Removal of solidified molten material from skin requires medical assistance. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION

Health: 2. 2= Materials hazardous to health, but areas may be entered freely with full-face mask self-contained breathing apparatus which provides eye protection. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-73] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 2. 2= Material which must be moderately heated before ignition will occur. Water spray may be used to extinguish the fire because the material can be cooled below its flash point. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-73] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-73] **PEER REVIEWED**

FLAMMABLE LIMITS

LOWER 0.9%; UPPER 5.9%. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-73] **PEER REVIEWED**

FLASH POINT

174 DEG F (OPEN CUP); 190 DEG F (CLOSED CUP) [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-73] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

526 deg C [Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984. V15 699 (1981)] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

USE WATER, CARBON DIOXIDE, DRY CHEMICAL, OR FOAM. FOAM OR DIRECT WATER SPRAY ON MOLTEN NAPHTHALENE MAY CAUSE EXTENSIVE

Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 100 meters (330 feet). Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2, sand, earth, water spray or regular foam. Large fires: Water spray, fog or regular foam. Move containers from fire area if you can do it without risk. Fire involving tanks or car/trailer loads: Cool containers with flooding quantities of water until well after fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Small dry spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area. Large spills: Wet down with water and dike for later disposal. Prevent entry into waterways, sewers, basements or confined areas. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing.

1 - HSDB

NAME OF SUBSTANCE NAPHTHALENE

CAS REGISTRY NUMBER 91-20-3

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or explosion: Flammable/combustible material. May be ignited by friction, heat, sparks or flames. Some may burn rapidly with flare burning effect. Powders, dusts, shavings, borings, turnings or cuttings may explode or burn with explosive violence. Substance may be transported in a molten form. May re-ignite after fire is extinguished. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: Fire may produce irritating and/or toxic gases. Contact may cause burns to skin and eyes. Contact with molten substance may cause severe burns to skin and eyes. Runoff from fire control may cause pollution. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 10 to 25 meters (30 to 80 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-133] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-133] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protection clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. /Naphthalene, crude; Naphthalene, molten; Naphthalene, refined/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-133] Hazardous Materials/Dangerous Goods

... Skin irritant ... /Methylated naphthalene/ [Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984. III-309] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING — NO DATA

OTHER PREVENTIVE MEASURES — NO DATA

STABILITY/SHELF LIFE — NO DATA

SHIPMENT METHODS AND REGULATIONS — NO DATA

STORAGE CONDITIONS — NO DATA

CLEANUP METHODS — NO DATA

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

The following wastewater treatment technology has been investigated for naphthalene: Biological treatment. /Naphthalene/ [USEPA; Management of Hazardous Waste Leachate, EPA Contract No.68-03-2766 p.E-3-E-22 (1982)] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL — NO DATA

NAME OF SUBSTANCE 2-METHYLNAPHTHALENE
CAS REGISTRY NUMBER 91-57-6

HAZARDS SUMMARY

The major hazards encountered in the use and handling of 2-methylnaphthalene stem from its toxicologic properties. Toxic by all routes (ie, ingestion, inhalation, and dermal contact), exposure to this crystaline substance may occur from its production or use as a chemical intermediate in organic syntheses, in insecticides, or as a dye carrier. Effects from exposure may include facial flushing, fever, headache, skin irritation, corneal damage, nausea, anorexia, hemoglobinuria, hepatocellular injury, convulsions, and coma. Before implementing land disposal of waste 2-methylnaphthalene, consult with environmental regulatory agencies for guidance. **PEER REVIEWED**

DOT EMERGENCY GUIDELINES NO DATA
FIRE POTENTIAL NO DATA
NFPA HAZARD CLASSIFICATION NO DATA
FLAMMABLE LIMITS NO DATA
FLASH POINT NO DATA
AUTOIGNITION TEMPERATURE NO DATA
FIRE FIGHTING PROCEDURES NO DATA
TOXIC COMBUSTION PRODUCTS NO DATA
OTHER FIRE FIGHTING HAZARDS NO DATA
EXPLOSIVE LIMITS AND POTENTIAL NO DATA
REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION

When heated to decomp it emits acrid smoke & fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1882] **PEER REVIEWED**

POLYMERIZATION NO DATA
OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

1.00X10-2 ppm at room temp (detection in air, chemically pure) [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 103] **PEER REVIEWED**

ODOR THRESHOLD

2.00X10-2 ppm at room temp and 60 deg C (detection in air, chemically pure) [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 103] **PEER REVIEWED**

ODOR THRESHOLD

5.00X10-2 ppm at 60 deg C (detection in air, chemically pure) [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 103] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

If material 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. Attempt to stop leak if without hazard. Use water spray to knock down vapors. ... Evacuation: If material leaking (not on fire), consider evacuation from downwind area based on amt of material spilled, location & weather conditions. /Methyl chloride methylene chloride mixture/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 450] Hazardous Materials Systems (BOE), 1987., p. 450] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the permissible level. However, there are some exceptions where respirators may be used to control exposure. Respirators may be used when engineering and work practice controls are not technically feasible, when such controls are in the process of being installed, or when they fail and need to be supplemented.

any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 208] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 208] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: At concentrations above the NIOSH REL, or where there is no REL at any detectable cocentration. Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 208] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 208] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 163] of Documents, GPO, February 1987., p. 163] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses.

chlorides, and polyvinyl alcohol. Methylene chloride permeated through all materials, except polyvinyl alcohol, with breakthrough times in the range of 2 to 8 min, and permeation rates in the range of 1250-5800 ug/sq cm min. ... It was shown that for /methylene chloride/, there is a correlation between the solubility (weight gain) and the ratio of permeation rate to breakthrough time (PR/BT). For all material/chemical pairs, an increase in solubility, increased (PR/BT). The change in material thickness had an effect on breakthrough time and permeation rate, but no effect on normalized breakthrough time. An increase in thickness reduced permeation rate and increased breakthrough time. [Vahdat N; Am Ind Hyg Assoc J 48 (7): 646-51 (1987)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

PRECAUTIONS FOR "CARCINOGENS": ... Dispensers of liq detergent /should be available./ ... Safety pipettes should be used for all pipetting. ... In animal laboratory, personnel should ... wear protective suits (preferably disposable, one piece & close fitting at ankles & wrists), gloves, hair covering & overshoes. ... In chemical laboratory, gloves & gowns should always be worn ... however, gloves should not be assumed to provide full protection. Carefully fitted masks or respirators may be necessary when working with particulates or gases, & disposable plastic aprons might provide addnl protection. ... Gowns ... /should be/ of distinctive color, this is a reminder that they are not to be worn outside the laboratory. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 8] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 8] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

For methylene chloride breakthrough times less (usually significantly less) than one hour reported by (normally) two or more testers for natural rubber, neoprene/sytrene-butadiene rubber, neoprene/natural rubber, nitrile, polyethylene, and polyvinyl chloride. [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.50 (1983)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

For methylene chloride some data suggesting breakthrough times of approximately an hour or more for polyvinyl alcohol and viton. [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.50 (1983)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 208] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 208] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is

U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

ODOR THRESHOLD

2.14x10+2 ppm (odor recognition in air; chemically pure sample) [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 109] **PEER REVIEWED**

ODOR THRESHOLD

Odor thresholds: low= 540 mg/cu m; high= 2160 mg/cu m. [Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)] **PEER REVIEWED**

ODOR THRESHOLD

Odor index: 2100 @ 20 deg C [Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983., p. 848] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Irritation of eyes and respiratory tract. [ITII. Toxic and Hazarous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1982., p. 335] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate chemical protective ... boots ... [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 244] Hazardous Materials Systems (BOE), 1987., p. 244] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with & required to use impervious clothing, gloves, face shields (eight-in minimum), & other appropriate protective clothing necessary to prevent repeated or prolonged skin contact with liq methylene chloride. ... Employees should be provided with & required to use splash-proof safety goggles where liq methylene chloride may contact the eye. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 363] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 363] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

... Polyvinyl chloride (PVC) and natural rubber should not be used /for protective clothing/. Use neoprene for protective clothing. Do not use closed circuit rebreathing system employing soda lime or other carbon dioxide absorber because of formation of toxic compounds capable of producing cranial nerve paralysis. Equipment should not be iron or metal, susceptible to hydrogen chloride. [Kayser, R., D. Sterling, D. Viviani (eds.). Intermedia Priority Pollutant Guidance Documents. Washington, DC: U.S.Environmental Protection Agency, July 1982. 8-1] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

The permeation of methylene chloride ... through seven protective clothing materials was studied to determine the permeation parameters, and to investigate the effect of solubility (polymer weight gain) and material thickness on the permeation parameters. The materials tested were two different nitrile rubbers, neoprene, combination (a blend of natural rubber, neoprene and nitrile), two different polyvinyl

violently. Such materials include: ... dichloromethane .... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1261] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Dichloromethane dissolves endothermically in concentrated nitric acid to give a detonable soln. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1110] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Contact of 1.5 g portions of the solid /potassium tert-butoxide/ ... with drops of ... dichloromethane caused ignition after ... 2 min. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 456] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

PROLONGED HEATING WITH WATER @ 180 DEG C RESULTS IN FORMATION OF FORMIC ACID, METHYL CHLORIDE, METHANOL, HYDROCHLORIC ACID & SOME CARBON MONOXIDE. [IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, V20 450 (1979)] 1972-PRESENT. (Multivolume work). V20 450 (1979)] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... WILL FORM EXPLOSIVE MIXTURES IN ATMOSPHERE HAVING HIGH OXYGEN CONTENT, IN LIQ OXYGEN, NITROGEN TETROXIDE, SODIUM-POTASSIUM ALLOY. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1763] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Contact with strong oxidizers, strong caustics and chemically active metals such as aluminum or magnesium powder, sodium and potassium may cause fires and explosions. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Dichloromethane, previously considered to be nonflammable except in oxygen, becomes flammable in air at 102 deg C/1 bar, @ 27 deg C/1.7 bar or @ 27 deg C/1 bar in presence of less than 0.5 vol% of methanol ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 141] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers; caustics; chemically-active metals such as aluminum, magnesium powders, potassium & sodium; concentrated nitric acid. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 208] **QC REVIEWED**

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

205-307 ppm [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.:

water. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-160] **QC REVIEWED**

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

USE WATER SPRAY TO KEEP FIRE-EXPOSED CONTAINERS COOL. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-39] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Extinguishant: Dry chemical, carbon dioxide, foam. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

Toxic gases and vapors (such as hydrogen chloride, phosgene and carbon monoxide) may be released in a fire involving methylene chloride. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

UPPER 66.4% IN OXYGEN; LOWER 15.5% IN OXYGEN [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1763] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

NONE UNDER ORDINARY CONDITIONS ... [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1763] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Mixtures of /dinitrogen/ tetraoxide with ... dichloromethane ... are explosive when subjected to shock of 25 g TNT equiv or less. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1297] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Mixtures of lithium shavings with several halocarbon derivatives are impact sensitive and will explode, sometimes

(1996). G-160] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 100 meters (330 feet). Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-160] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-160] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. Small liquid spills: Take up with sand, earth or other noncombustible absorbent material. Large spills: Dike far ahead of liquid spill for later disposal. Prevent entry into waterways, sewers, basements or confined areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-160] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Wash skin with soap and

1 - HSDB

NAME OF SUBSTANCE METHYLENE CHLORIDE

CAS REGISTRY NUMBER 75-09-2

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: Vapors may cause dizziness or suffocation. Exposure in an enclosed area may be very harmful. Contact may irritate or burn skin and eyes. Fire may produce irritating and/or toxic gases. Runoff from fire control or dilution water may cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-160] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Some of these materials may burn, but none ignite readily. Most vapors are heavier than air. Air/vapor mixtures may explode when ignited. Container may explode in heat of fire. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-160] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep out of low areas. Ventilate closed spaces before entering. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-160] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-160] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-160] Materials Initiatives and Training (DHM-50), Washington, D.C.

Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 569] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

The use of respirators to achieve compliance with the recommened exposure limits is permitted only: (a) during the time necessary to install or test the required engineering controls, and (b) during emergencies or during nonroutine operations, such as maintenance or repair activities, when the concentration of airborne cresol may exceed the permissible environmental limit. [NIOSH; Criteria Document: Cresol p.8 (1978) DHEW Pub. NIOSH 78-133] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 78] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 78] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 78] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the

USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE VAPORS ... WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-32] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

MODERATE, IN THE FORM OF VAPOR WHEN EXPOSED TO HEAT OR FLAME. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 815] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

IT CAN REACT VIGOROUSLY WITH OXIDIZING MATERIALS. /CRESOL/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 814] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, acids. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 78] **QC REVIEWED**

DECOMPOSITION

DANGEROUS; WHEN HEATED TO DECOMPOSITION, IT EMITS HIGHLY TOXIC FUMES /CRESOL/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 814] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

0.2 ppm recognition in air; 0.46 ppb detection in air. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Fairly severe skin irritant. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

WEAR SELF-CONTAINED BREATHING APPARATUS. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-32] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

... TO PREVENT ABSORPTION THROUGH SKIN ... WEAR RUBBER HAND PROTECTION AND APRONS. /CRESOLS, CRESOTES AND DERIVATIVES/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 569] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

EYE PROTECTION SHOULD ... BE PROVIDED AGAINST DROPLETS OR SPRAY. /CRESOLS, CRESOTES AND DERIVATIVES/ [International

difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

FIRE POTENTIAL

LOW, WHEN EXPOSED TO HEAT OR FLAME [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 815] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 3. 3= Materials 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. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-28] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. ... water fog gently applied to the surface will cause a frothing which will extinguish the fire. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-28] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-28] **PEER REVIEWED**

FLAMMABLE LIMITS

1.1% BY VOL @ 302 DEG C [Sunshine, I. (ed.). CRC Handbook of Analytical Toxicology. Cleveland: The Chemical Rubber Co., 1969., p. 619] **PEER REVIEWED**

FLASH POINT

86 DEG C CLOSED CUP [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 369] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

1038 DEG F [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 815] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the material. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINER. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is

Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Combustible material: may burn but does not ignite readily. When heated, vapors may form explosive mixtures with air: indoors, outdoors, and sewers explosion hazards. Some may polymerize (P) explosively when heated or involved in a fire. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate enclosed areas. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. /Cresols/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-153] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-153] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-153] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and

1 - HSDB

NAME OF SUBSTANCE 4-METHYLPHENOL

CAS REGISTRY NUMBER 106-44-5

HAZARDS SUMMARY

The major hazards encountered in the use and handling of p-cresol stem from its toxicologic properties. Toxic by all routes (ie, inhalation, ingestion, and dermal absorption), exposure to this colorless to white, tar-smelling, crystalline substance may occur from its use in coal desulfurization, and in the production of disinfectants, explosives, perfumery materials, and phenolic resins. Effects from exposure may include nausea, contact burns to the skin and eyes, ventricular arrhythmias, pulmonary edema, seizures, coma, and death. Both the OSHA PEL and the ACGIH TLV have been set at a TWA of 5 ppm. In activities or situations where over exposure may occur, wear a self-contained breathing apparatus and full chemical protective clothing which is specifically recommended by the shipper or producer to prevent skin contact with p-cresol. If contact should occur, immediately flush affected skin or eyes with running water for at least 15 minutes, and remove contaminated clothing and shoes at the site. Eyewash and quick drench facilities should be readily available in p-cresol work areas. While p-cresol does not ignite easily, it can burn with the production of irritating and poisonous gases. Also, containers of p-cresol can explode violently in the heat of a fire. Fires involving p-cresol may be extinguished with dry chemical, CO2, Halon, water spray, or standard foam. Water spray, if used, should be applied with caution because it may cause frothing. Fight the fire from a maximum distance and dike runoff from fire control water. p-Cresol should be stored in iron or steel containers, in cool, dry, well-ventilated areas, away from oxidizing materials, and sources of ignition and physical damage. p-Cresol may be shipped via air, rail, road, and water, in containers bearing the label, "Poison". Small spills of p-cresol may be shovelled into clean, dry, covered containers for later disposal (solutions are first absorbed with sand or other noncombustible material). Large spills on land should be contained in pits or other excavated holding areas that are sealed with an impermeable flexible membrane liner. Any surface flow should be diked with sand bags, foamed concrete, or foamed polyurethane. Once contained, bulk p-cresol solutions can be neutralized with crushed limestone, soda ash, or lime, and absorbed with fly ash, cement powder, or sawdust. For spills in bodies of water, trap the material at the bottom with sand bags, or add activated carbon, then use mechanical dredges to remove the immobilized masses. p-Cresol is a good candidate for fluidized bed and rotary kiln forms of incineration. Prior to implementing land disposal of p-cresol, consult with environmental regulatory agencies for guidance.
PEER REVIEWED

DOT EMERGENCY GUIDELINES

Health: TOXIC; inhalation, ingestion, or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases.

Protect containers against physical damage. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 312] **PEER REVIEWED**

CLEANUP METHODS NO DATA

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Reuse: Sort, classify and put in a box properly labelled. Salvage profitably for reuse by local shop or sell as scrap metal. Recommendable method: Landfill. Peer-review: Soluble manganese cmpd can be mixed with fertilizer or sprayed on the land at strengths < 500 mg/l. Manganese decomposes water. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 200] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. /Manganese compounds and fume (as Mn)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 190] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. /Manganese compounds and fume (as Mn)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 190] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PREVENTION OF MANGANESE POISONING IS PRIMARILY A QUESTION OF SUPPRESSION OF TOXIC DUSTS & FUMES, & EFFECTIVE INDUSTRIAL HYGIENE & MEDICAL SUPERVISION. ... GOOD GENERAL VENTILATION OF DUST & FUMES AT SOURCE IS ESSENTIAL. ... INDEPENDENT RESPIRATORS MAY BE USED FOR SPECIAL APPLICATIONS ... /MANGANESE, ALLOYS AND CMPD/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1280] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

HIGH STD OF PERSONAL HYGIENE IS ESSENTIAL & PERSONAL CLEANLINESS, COMPULSORY SHOWERING AFTER WORK, A CHANGE OF CLOTHING, & BAN ON EATING AT WORK PLACE ARE NECESSARY. /MANGANESE, ALLOYS AND CMPD/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1280] **PEER REVIEWED**

STABILITY/SHELF LIFE

SUPERFICIALLY OXIDIZED ON EXPOSURE TO AIR [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 816] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS — NO DATA

STORAGE CONDITIONS

REACTIVITIES & INCOMPATIBILITIES

Oxidizers [Note: Will react with water or steam to produce hydrogen]. /Manganese compounds and fume (as Mn)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 190] **QC REVIEWED**

DECOMPOSITION

DECOMP COLD WATER SLOWLY, RAPIDLY ON HEATING; CONVERTED BY FLUORINE INTO DI- & TRIFLUORIDE, BY CHLORINE INTO THE DICHLORIDE [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 816] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 10 mg/cu m. Respirator Class(es): Any dust and mist respirator except single-use and quarter-mask respirators. If not present as a fume. Any supplied-air respirator. /Manganese compounds and fume (as Mn)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 190] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 25 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. Any powered, air-purifying respirator with a dust and mist filter. If not present as a fume. /Manganese compounds and fume (as Mn)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 190] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 50 mg/cu m. Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode. Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. /Manganese compounds and fume (as Mn)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 190] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 500 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode. /Manganese compounds and fume (as Mn)/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 190] **QC REVIEWED**

hopper below the bag and a drastic explosion resulted. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-125] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Heated manganese ignites in chlorine and burns brilliantly. Powdered manganese ignites in chlorine and burns brilliantly. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-125] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

When powdered manganese is exposed to fluorine, the reaction takes place with incandescence. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-125] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Concentrated nitric acid reacts with powdered manganese with incandescence and ... explosion. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-125] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

When manganese is heated in the vapor of phosphorus at a very dull red heat, union occurs with incandescence. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-125] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Pyrophoric manganese burns with a brilliant flame when heated in sulfur dioxide vapor. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-125] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

PURE ELECTROLYTIC MANGANESE IS NOT ATTACKED BY WATER AT ORDINARY TEMP; SLIGHTLY ATTACKED BY STEAM [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 816] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

REACTS WITH DIL MINERAL ACIDS WITH EVOLUTION OF HYDROGEN & FORMATION OF DIVALENT MANGANOUS SALTS [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 816] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

AS POWDER IT REDUCES METALLIC OXIDES ON HEATING; ON HEATING REACTS DIRECTLY WITH CARBON, PHOSPHORUS, ANTIMONY, OR ARSENIC [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 816] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Violent decomposition of hydrogen peroxide (52% by weight or greater) may be caused by contact with many substances, such as ... manganese and /its/ salts. /Manganese and manganese salts/ [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-112] **PEER REVIEWED**

1 - HSDB

NAME OF SUBSTANCE MANGANESE

CAS REGISTRY NUMBER 7439-96-5

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

MODERATE, IN FORM OF DUST OR POWDER, WHEN EXPOSED TO FLAME. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1729] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE

MANGANESE DUST CLOUDS HAVE MINIMAL IGNITION TEMP OF 450 DEG C. ... THE LIMITING OXYGEN (O2) PERCENTAGE PREVENTING IGNITION OF DUST CLOUD IS 15. [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 1767] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Use dry chemical to extinguish. [Worthing, C.R. and S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 8th ed. Thornton Heath, UK: The British Crop Protection Council, 1987., p. 727] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

EXPLOSION HAZARD: MODERATE, IN FORM OF DUST, WHEN EXPOSED TO FLAME. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1729] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

THE MINIMUM EXPLOSIVE CONCN IS 125 OZ/1000 CU FEET PRODUCING A MAXIMAL EXPLOSION PRESSURE OF 50 PSI ... . [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 1767] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

BURNS WITH WHITE LIGHT WHEN HEATED IN AIR. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 816] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

WILL REACT WITH WATER OR STEAM TO PRODUCE HYDROGEN; CAN REACT WITH OXIDIZING MATERIALS. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1729] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

WHEN HEATED IN NITROGEN ABOVE 200 DEG C IT BURNS TO FORM A NITRIDE. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 816] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

During a fire in an industrial bag filter, a mixture of aluminum and manganese dust was inadvertently released from the

means, for example hydrogen peroxide. E) Catalytic dehalogenation has been proven to be a useless method. Physical methods offer perspectives. HCH-isomers in general and lindane in particular are well adsorbed, and carbon adsorption or flocculation would be good methods to remove these cmpd from effluent waters. It should be remembered, however, that the presence of methanol in the effluents of lindane production is one of the main difficulties in designing methods for the purification of effluents. Not only does methanol increase the solubility of HCH-isomers in water, but it also elutes HCH-isomers when they are adsorbed on activated carbon or such like materials. Heavily contaminated waters and unwanted residues can be destroyed by incineration. Recommendable method: Incineration. Peer-review: Excess hydrocarbon fuel should be used. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 152] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL NO DATA

metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) should be disposed of in pesticide incinerators or in specified landfill sites. /Organic or metallo-organic pesticides/ [40 CFR 165 (7/1/86)] **PEER REVIEWED**

DISPOSAL METHODS

Group II Containers: Non-combustible containers from organic or metallo-organic pesticides (except organic mercury, lead, cadmium, or arsenic compounds) must first be triple-rinsed. Containers that are in good condition may be returned to the manufacturer or formulator of the pesticide product, or to a drum reconditioner for reuse with the same type of pesticide product, if such reuse is legal under Department of Transportation regulations (eg 49 CFR 173.28). Containers that are not to be reused should be punctured ... and transported to a scrap metal facility for recycling, disposal, or burial in a designated landfill. /Organic or metallo-organic pesticides/ [40 CFR 165 (7/1/86)] **PEER REVIEWED**

DISPOSAL METHODS

Potential candidate for rotary kiln incineration with a temperature range of 820-1600 deg C with residence times for liquids and gases: seconds; solids, hours. Also, a potential for fluidized bed incineration with a temperature range of 450-980 deg C with residence times for liquids and gases: seconds; solids, longer. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.3-13 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Pyrolysis: A process has been developed for the destructive pyrolysis of benzene hexachloride at 400-500 deg C with a catalyst mixture which contains 5-10% of either cupric chloride, ferric chloride, zinc chloride, or aluminum chloride on activated carbon. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 151] **QC REVIEWED**

DISPOSAL METHODS

Encapsulation & landfill: Lindane may be disposed of in sealed containers in a secured sanitary landfill. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 151] **QC REVIEWED**

DISPOSAL METHODS

Chemical methods are of little use. A) HCH /hexachlorocyclohexane/ isomers cannot be hydrolyzed. Action of alkali results in dehydrohalogenation under formation of, first, pentachlorocyclohexene and finally trichlorobenzene. It is a matter of judgment, not to be made here, whether these cmpd are more or less objectionable as environmental pollutants than HCH-isomers. Apart from this, no method has been mentioned to effectuate this conversion in dilute aqueous soln or suspensions. B) Chlorination of effluent water makes no sense since the cmpd in question are already highly chlorinated. C) Ozonization has no effect; by lack of double bonds HCH-isomers cannot react with ozone. D) Nor can they be oxidized with other

dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3097-1,6193,6194,6195 (1988)] **QC REVIEWED**

STORAGE CONDITIONS

STORE IN DRY PLACE. ... AVOID EXPOSURE ... TO EXTREME HEAT, STRONG ALKALIS, & POWDERED METALS. [Farm Chemicals Handbook 1986. Willoughby, Ohio: Meister Publishing Co., 1986. C-141] **PEER REVIEWED**

CLEANUP METHODS

A PROCESS FOR REMOVING POLLUTANTS FROM DU PONT'S CHAMBERS WORKS PLANT IN DEEPWATER, NJ IS DESCRIBED. PROCESS CALLS FOR TREATMENT OF WASTES FROM ORG CHEM MFR PROCESSES BY NEUTRALIZATION & SETTLING, FOLLOWED BY A COMBINED POWDERED CARBON-BIOLOGICAL PROCESS. SPECIFIC INFORMATION IS GIVEN REGARDING REMOVAL OF PRIORITY POLLUTANTS FROM WASTE WATER; BHC ISOMERS ARE INCLUDED. [HUTTON DG; IND WASTES (CHICAGO) 26 (2): 22, 24, 26 (1980)] **PEER REVIEWED**

CLEANUP METHODS

Liquids containing lindane should be absorbed in vermiculite, dry sand, earth, or a similar material. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

CLEANUP METHODS

For spills and leakage ... dampen spilled material with alcohol to avoid dust, then transfer material to suitable container. Use absorbent paper dampened with alcohol to pick up remaining material. Wash surfaces well with soap & water. Seal all wastes in vapor-tight plastic bags for eventual disposal. [Keith, L.H., D.B. Walters, (eds.). Compendium of Safety Data Sheets for Research and Industrial Chemicals. Parts I,II,and III. Deerfield Beach, FL: VCH Publishers, 1985., p. 1061] **PEER REVIEWED**

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Lindane /formulation of/ 12% emulsifiable concentrate with 71% aromatic petroleum, 12% xylene, and 5% emulsifier /under a trial burn/ in a liquid injection incinerator at 1043-1265 deg C with a residence time of 0.132-1.77 seconds and 31-50% excess air /provided/ a destruction efficiency of > 99.999%. [USEPA; Engineering Handbook for Hazardous Waste Incineration p.F-4 (1981) EPA 68-03-3025] **PEER REVIEWED**

DISPOSAL METHODS

Group I Containers: Combustible containers from organic or

should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

STABILITY/SHELF LIFE

STABLE TO HEAT, LIGHT, OXIDATION. [White-Stevens, R. (ed.). Pesticides in the Environment: Volume 1, Part 1, Part 2. New York: Marcel Dekker, Inc., 1971., p. 87] **PEER REVIEWED**

STABILITY/SHELF LIFE

... Stable to ... air & acids. Sensitive to alkalis. [Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. Old Woking, Surrey, United Kingdom: Royal Society of Chemistry/Unwin Brothers Ltd., 1983. A247/OCT 83] **PEER REVIEWED**

STABILITY/SHELF LIFE

Stable below 180 deg C ... At 22 deg C, 50% loss occurs in 191 days at pH 7, in 11 hr at pH 9. [Worthing, C.R., S.B. Walker (eds.). The Pesticide Manual - A World Compendium. 7th ed. Lavenham, Suffolk, Great Britain: The Lavenham Press Limited, 1983., p. 300] **PEER REVIEWED**

STABILITY/SHELF LIFE

DECOMP IN PRESENCE OF ALKALI AT AMBIENT TEMP, FORMING TRICHLOROBENZENES; DECOMP BY POWDERED IRON, ALUMINUM & ZINC [IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, V20 199 (1979)] 1972-PRESENT. (Multivolume work). V20 199 (1979)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials. [IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1995., p. 189] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes

detergent and water to remove any lindane. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Eating and smoking should not be permitted in areas where solid lindane is handled, processed, or stored. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees who handle lindane or liquids containing lindane should wash their hands thoroughly with soap or mild detergent and water before eating, smoking, or using toilet facilities. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If leak or spill has not ignited, use water spray to disperse vapors & to provide protection for men attempting to stop leak. Water spray may be used to flush spills away from exposures. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S. Dept. of Health and Human Services, NIOSH/Supt., p. 149] of Documents, GPO, February 1987., p. 149] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 187] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 50 mg/cu m. Respirator Class(es): Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator that has a full face piece and is operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Quick drench showers should be provided. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees should change from clothing that has become contaminated with lindane or liquids containing lindane into uncontaminated clothing before leaving the work premises. Clothing contaminated with lindane should be placed into closed containers for storage until it can be discarded or until provision is made for the removal of lindane from the clothing. If the clothing is to be laundered or otherwise cleaned to remove the lindane, the person performing the operation, should be informed of lindane's hazardous properties. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Skin that becomes contaminated with solid or liquids containing lindane should be promptly washed or showered with soap or mild

Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 4] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 4] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 5 mg/cu m. Respirator Class(es): Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. Any supplied-air respirator. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 12.5 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. May require eye protection. Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. May require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 25 mg/cu m. Respirator Class(es): Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter. Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter. Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter. May require eye protection. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

ed. Boston, MA: National Fire Protection Association, 1986. 49-58] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS

Vapors form toxic concentrations at slightly elevated temperatures. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-58] **PEER REVIEWED**

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

VAPORS MAY IRRITATE EYES, NOSE, & THROAT. [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 789] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use dust and splash-proof safety goggles where lindane or liquids containing lindane may contact the eyes. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 3] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 3] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Respiratory protection for lindane is as follows: Particulate concn 5 mg/cu m or less: Any chemical cartridge respirator with an organic vapor cartridge and dust and mist filter, including pesticide respirators which meet the requirements of this class; supplied-air respirator; self-contained breathing apparatus. 25 mg/cu m or less: Chemical cartridge respirator with a full facepiece, organic vapor cartridge and dust and mist filter, including pesticide respirators which meet the requirements of this class; gas mask with a chin-style or a front or back-mounted organic vapor canister and dust and mist filter, including pesticide respirators which meet the requirements of this class; supplied-air respirator with a full facepiece, helmet, or hood; self-contained breathing apparatus with a full facepiece. 500 mg/cu m or less: Powered air-purifying respirator with an organic vapor cartridge and high effeciency particulate filter, including pesticide respirators which meet the requirements of this class; type-C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode. 1000 mg/cu m or less: Type-C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece operated in continuous-flow mode. Greater than 1000 mg/cu m or entry escape from unknown concentrations: Combination respirator which includes a type-C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. Escape: any gas mask providing protection against organic vapors and particulates, including pesticide respirators which meet the requirements of this class: any escape self-contained breathing apparatus. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health

Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health 2. 2 = Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus. /Lindane solution/ [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity 0. 0 = Materials which are normally stable even under fire exposure conditions, and which are not reactive with water. Normal fire fighting procedures may be used. /Lindane solution/ [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

FLAMMABLE LIMITS NO DATA

FLASH POINT

APPROX 150 DEG F CLOSED CUP [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

For liquid formulations use water spray, carbon dioxide, dry chemical, or foam. Use water to keep fire-exposed containers cool. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

... If heated to decomposition in air, it emits highly toxic fumes of phosgene & hydrogen chloride. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

Corrosive to metals. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 186] **QC REVIEWED**

DECOMPOSITION

Decomposition product includes ... carbon monoxide. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

DECOMPOSITION

... Hydrogen chloride and phosgene. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

FIRE POTENTIAL

The dry powder will not burn ... Commercial solutions normally contain flammable or combustible liquids with flash points approx 150 deg F or over. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability 0. 0 = Materials that will not burn. /Lindane dry powder/ [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health 2. 2 = Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus. /Lindane dry powder/ [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity 0. 0 = Materials which are normally stable even under fire exposure conditions, and which are not reactive with water. Normal fire fighting procedures may be used. /Lindane dry powder/ [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-57] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability 1. 1 = Materials that must be preheated before ignition can occur. Water may cause frothing of liquids with this flammability rating number if it gets below the surface of the liquid and turns to steam. However, water spray gently applied to the surface will cause a frothing which will extinguish the fire. Most combustible solids have a flammability rating of 1. /Lindane solution/ [National Fire

Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY". Fire: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small fires: Dry chemical, CO2 or water spray. Large fires: Water spray, fog or regular 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

1 - HSDB

NAME OF SUBSTANCE LINDANE

CAS REGISTRY NUMBER 58-89-9

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. Runoff may pollute waterways. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: CALL Emergency Response Telephone Number on Shipping Paper. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-151] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-151] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. Structural firefighters' protective clothing is recommended for fire situations ONLY; it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-151] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs

CLEANUP METHODS

... Described treatment of wastewater from a tetraethyl lead manufacturing process. Two major categories of waste were inorganic lead wastewaters and organic lead wastewaters. After sedimentation in a holding basin to recover solid lead and lead oxide, the inorganic lead waste fraction (66.1 mg/l) was effectively treated by coagulation with ferric and ferrous sulfate. /Inorganic lead/ [Patterson JW; Industrial Wastewater Treatment Technolgy 2nd Edition p.75 (1985)] **PEER REVIEWED**

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Precipitation is the preferred treatment process for removing toxic heavy metals from electroplating waters. Precipitation processes include hydroxide, lime and/or sulfide treatment. Chemical reduction is used to treat complex metals such as nickel, copper, hexavalent chromium waste, soluble lead, silver, metal containing cyanide, and mercury. Adsorption has shown potential for treating and polishing aqueous metal bearing wastes. Activated carbon, activated alumina, and iron filings are all applicable adsorbents. Alkaline chlorination and incineration are effective cyanide destruction treatments. Evaporation, ion-exchange, reverse osmosis, electrodialysis, and electrolytic recovery are waste reduction and recovery techniques applicable to metal bearing hazardous streams. [Grosse DW; 12th Annual Research Symposium on Land Disposal, Remedial Action, Incineration, and Treatment of Hazardous Wastes (1986)] **PEER REVIEWED**

RADIATION LIMITS AND POTENTIAL — NO DATA

The worker should wash daily at the end of each work shift. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premises. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

STABILITY/SHELF LIFE

TARNISHES ON EXPOSURE TO AIR; ATTACKED BY PURE WATER, WEAK ORG ACIDS IN PRESENCE OF OXYGEN; RESISTANT TO TAP WATER, HYDROFLUORIC ACID, BRINE, SOLVENTS [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 776] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS NO DATA

STORAGE CONDITIONS

IN GENERAL, /TO AVOID INDUSTRIAL FIRES/ MATERIALS WHICH ARE TOXIC AS STORED OR WHICH CAN DECOMPOSE INTO TOXIC COMPONENTS DUE TO CONTACT WITH HEAT, MOISTURE, ACIDS, OR ACID FUMES, SHOULD BE STORED IN COOL, WELL VENTILATED PLACE, OUT OF THE DIRECT RAYS OF THE SUN, AWAY FROM AREAS OF HIGH FIRE HAZARD, & SHOULD BE PERIODICALLY INSPECTED & MONITORED. INCOMPATIBLE MATERIALS SHOULD BE ISOLATED FROM EACH OTHER. /INORGANIC LEAD/ [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Rheinhold, 1979., p. 248] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations: Water spill: Neutralize with agricultural lime (CaO), crushed limestone ($CaCO_3$), or sodium bicarbonate ($NaHCO_3$). Adjust pH to neutral (pH= 7). Use mechanical dredges of lifts to remove immobilized masses of pollutants & precipitates. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 407] Hazardous Materials Systems (BOE), 1987., p. 407] **PEER REVIEWED**

CLEANUP METHODS

Environmental considerations: Land spill: Dig a pit, pond, lagoon, or holding area to contain liquid or solid material. /SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be contained with a flexible impermeable membrane liner./ Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 407] Hazardous Materials Systems (BOE), 1987., p. 407] **PEER REVIEWED**

SRP: Contaminated protective clothing should be segregated in such a manner so that there is no direct personal contact by personnel who handle, dispose, or clean the clothing. Quality assurance to ascertain the completeness of the cleaning procedures should be implemented before the decontaminated protective clothing is returned for reuse by the workers. All contaminated clothing should not be taken home at end of shift, but should remain at employee's place of work for cleaning. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Employees should wash daily at the end of each work shift. /Inorganic lead/ [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 544] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

POISONING SOLELY OR MAINLY FROM THE INGESTION OF LEAD COMPOUNDS IS OF RELATIVELY INFREQUENT OCCURRENCE IN AMERICAN INDUSTRY ... /MAINLY/ BECAUSE OF THE VIRTUAL INEVITABILITY OF THE CONTAMINATION OF THE ATMOSPHERE OF WORKROOMS IN THE LEAD USING INDUSTRIES WITH LEAD COMPOUNDS, & THE DIFFICULTIES THAT ATTEND THE AVOIDANCE OF SOME DEGREE OF RESPIRATORY EXPOSURE TO, & ABSORPTION OF, THESE COMPOUNDS. ... INGESTION OF LEAD COMPOUNDS IN THE COURSE OF THE DAY'S WORK CAN & SHOULD ALWAYS BE PREVENTED THROUGH EXERCISE OF REGULAR, ATTENTIVE CARE IN MATTERS OF PERSONAL CLEANLINESS & GOOD HOUSEKEEPING, WHILE PREVENTION OF THE INHALATION OF LEAD IS MUCH MORE DIFFICULT. ... THE LARGEST PROPORTION OF THE LEAD ABSORBED BY THE ... VICTIM OF INDUSTRIAL LEAD POISONING IS DERIVED FROM THE RESPIRED AIR. FOR THESE REASONS THE DETERMINATION OF THE RESPIRABLE LEAD IN THE ATMOSPHERE OF WORKROOMS MAY YIELD FAIRLY ADEQUATE INFORMATION AS TO THE MAGNITUDE OF THE OCCUPATIONAL LEAD HAZARD IN SUCH ROOMS. /INORGANIC LEAD/ [Patty, F. (ed.). Industrial Hygiene and Toxicology: Volume II: Toxicology. 2nd ed. New York: Interscience Publishers, 1963., p. 949] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

OSHA has recommended engineering controls over administrative controls and protective equipment to reduce exposures to chemicals in the workplace. The application of employee training and motivation programs (such as job safety analysis) to reduce exposures to chemicals has not been emphasized. To determine the effectiveness of such programs, a pilot project in an alkyl lead production facility was conducted with 35 employees in an effort to reduce exposures to organic and inorganic lead (Pb). Results after 12 mo showed a 40% reduction in Pb in urine and a 24% reduction in Pb in blood, both indicators of total exposure to organic and inorganic Pb. /Inorganic and alkyl lead/ [Maples TW et al; Am Ind Hyg Assoc J 43 (9): 692-4 (1982)] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Protective clothing shall be changed at least daily at the end of the shift and more frequently if it should become grossly contaminated. /Inorganic lead/ [NIOSH; Criteria Document: Inorganic lead p.I-9 (1978) DHEW Pub. NIOSH 78-158] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

techniques. The area should have general dilution ventilation, but also local exhaust systems for dry clay and glaze mixing, liquid glaze spraying and for the kiln emissions. All dry clays and glazes should be stored in sealed containers (not in ripped open paper bags). Plastic garbage cans with lids, on wheels, or similar containers can be used. All materials should be handled in a manner that prevents the creation of dusts. Premixed liquid glazes should be used and work done with materials in the wet form as much as possible. Good housekeeping is essential to keep the dust level down. There must be no dry sweeping or vacuuming in the studio, as this will resuspend settled dust that can be inhaled by the artists. Wet mopping, wet wiping and wet vacuuming or high efficiency particulate air (HEPA) filtered vacuuming is recommended. Protective equipment such as respirators, heat resistant gloves, eye protection, emergency showers and fire extinguishers are recommended around kilns. Proper studio design is important to insure that adequate ventilation, proper storage areas, handwashing sinks, safety equipment and other facilities are provided and safety hazards are avoided. Personal hygiene is also important. Artists should not eat, drink or smoke in the studio. Clothes should be washed daily. Hands and particularly nails should be washed frequently throughout the day, especially before eating, drinking, smoking or leaving the studio for the day. [Hart C; J Environ Health 49 (5): 285-86 (1987)] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Cloakroom accommodation should be provided for personal protective equipment with separate accommodation for clothing taken off during working hours. Washing accommodation, including bathing accommodation with warm water, should be provided and used. Time should be allowed for washing before eating. Arrangements should be made to prohibit eating and smoking in the vicinity of lead processes and suitable messrooms should be provided. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1204] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. [CITATION] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

1) The employer shall ensure that all personal protective devices are inspected regularly and maintained in clean and satisfactory working condition. 2) Working clothing and shoes shall not be taken home by employees. The employer shall provide for maintenance and laundering of protective clothing. 3) The employer shall ensure that precautions necessary to protect laundry personnel are taken when soiled protective clothing is laundered. /Inorganic lead/ [NIOSH; Criteria Document: Inorganic lead p.I-9 (1978) DHEW Pub. NIOSH 78-158] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 2.5 mg/cu m. Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode. Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter. Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 50 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 100 mg/cu m. Respirator Class(es): Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Control of exposure to toxic materials in ceramics is important because of the large variety of toxic materials /including lead tetroxide/. Dust control is of paramount importance. This is accomplished by good local exhaust ventilation, careful handling and storage of materials and proper clean-up

air-purifying respirator with high efficiency particulate filter. Not in excess of 200 mg/cu m: Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive-pressure mode, or with a full facepiece, helmet, or hood, operated in continuous-flow mode. Greater than 200 mg/cu m, or entry and escape from unknown concn: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator, which includes a type C supplied-air respirator with a full facepiece, operated in pressure demand or other positive-pressure or continuous-flow mode and an auxiliary, self-contained, breathing apparatus operated in pressure-demand or other positive-pressure mode. /Inorganic lead/ [NIOSH; Criteria Document: Inorganic Lead p.I-7 (1978) DHEW Pub. NIOSH 78-158] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Overalls or other full body protective clothing shall be worn in areas where there is occupational exposure to inorganic lead. /Inorganic lead/ [NIOSH; Criteria Document: Inorganic lead p.I-9 (1978) DHEW Pub. NIOSH 78-158] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Workers who are exposed to lead in any of its forms should wear personal protective equipment, which should be washed or renewed at least once a week. Protective clothing made of certain man made fibers retains much less dust than cotton overalls and should be used where the conditions of work render it possible; turn ups, pleats and pockets in which lead dust may collect should be avoided. /Inorganic lead/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1204] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 0.5 mg/cu m. Respirator Class(es): Any air-purifying respirator with a high-efficiency particulate filter. Any supplied-air respirator. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 1.25 mg/cu m. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. Any powered, air-purifying respirator with a high-efficiency particulate filter. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1197] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... Lead containing dry-box gloves may ignite in nitric acid environment. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1119] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Finely divided lead produced by reduction of the oxide with furfural vapor at 290 deg C is pyrophoric and chemically reactive. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1383] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

A solution of sodium azide in copper pipe with lead joints formed copper azide and lead azide, both detonating compounds. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-191] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

REACTS WITH HOT CONCN NITRIC ACID, BOILING CONCN HYDROCHLORIC & SULFURIC ACIDS [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 776] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Strong oxidizers, hydrogen peroxide, acids. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 184] **QC REVIEWED**

DECOMPOSITION

When heated ... emits highly toxic fumes. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1689] **QC REVIEWED**

POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Full facepiece is required if the lead aerosols cause eye or skin irritation at the use concn. Full facepiece, self-contained breathing apparatus operated in positive pressure mode should be used when lead is at a concn 100 mg/cu m, at an unknown concn, or when fire fighting. /Inorganic lead cmpd/ [29 CFR 1910.1025 (07/01/87)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Not in excess of 0.5 mg/cu m: Dust mask, except single use. Not in excess of 1 mg/cu m: Dust and mist respirator, except single use and quarter-mask respirators. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator or any self-contained breathing apparatus. Not in excess of 5 mg/cu m: A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece. Any self contained breathing apparatus with a full facepiece. Not in excess of 100 mg/cu m: Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode. A powered

1 - HSDB

NAME OF SUBSTANCE LEAD

CAS REGISTRY NUMBER 7439-92-1

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

An alloy of 10% to 70% zirconium plus lead will ignite when struck with a hammer. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-114] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES NO DATA

TOXIC COMBUSTION PRODUCTS

DANGEROUS WHEN HEATED, IT EMITS HIGHLY TOXIC FUMES. /LEAD CMPD/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1689] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

CAN REACT VIGOROUSLY WITH OXIDIZING MATERIALS. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 1689] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Ground mixtures of sodium carbide and ... lead ... can react vigorously. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-128] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... Trituration in a mortar of disodium acetylide with finely divided lead may be violent, carbon being liberated. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 320] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... Reaction with chlorine trifluoride at ambient or slightly elevated temp is violent, ignition often occurring. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 898] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Mixtures of trioxane with 60% hydrogen peroxide solution are detonable by heat or shock, or spontaneously after contact with metallic lead. The latter may be ... /due/ to the heat of oxidation of lead. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1158] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... Reacts violently or explosively with fused ammonium nitrate below 200 deg C. [Bretherick, L. Handbook of Reactive Chemical

McGraw-Hill Book Co., 1971., p. 692] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

EXTINGUISH WITH DRY CHEMICALS, FOAM OR CARBON DIOXIDE. WATER MAY BE INEFFECTIVE ON FIRE. COOL EXPOSED CONTAINERS WITH WATER. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA
REACTIVITIES & INCOMPATIBILITIES	NO DATA
DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

VAPOR (GAS) IRRITANT CHARACTERISTICS: VAPORS ARE NONIRRITATING TO EYES AND THROAT. LIQUID OR SOLID IRRITANT CHARACTERISTICS: MINIMUM HAZARD. IF SPILLED ON CLOTHING AND ALLOWED TO REMAIN, MAY CAUSE SMARTING AND REDDENING OF THE SKIN. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

LIQUID /IS/ IRRITATING TO ... EYES. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

SELF-CONTAINED OR AIR-LINE BREATHING APPARATUS; SOLVENT-RESISTANT RUBBER GLOVES; CHEMICAL SPLASH GOGGLES [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION

Health: 2. 2= Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-30] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 2. 2= Liquids which must be moderately heated before ignition will occur and solids that readily give off flammable vapors. Water spray may be used to extinguish the fire because the material can be cooled to below its flash point. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-30] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Materials which are normally stable even under fire exposure conditions, and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-30] **PEER REVIEWED**

FLAMMABLE LIMITS

0.7%-5.6% [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

FLASH POINT

117 Deg F (open cup) [Browning, E. Toxicity and Metabolism of Industrial Solvents. New York: American Elsevier, 1965., p. 103] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

436 DEG C [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York:

Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 300 meters (1000 feet). Fire: If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Caution: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or regular foam. Large fires: Water spray, fog or regular foam. Do not use straight streams. Move containers from fire area if you can do it without risk. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous

1 - HSDB

NAME OF SUBSTANCE ISOPROPYL TOLENE

CAS REGISTRY NUMBER 99-87-6

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or explosion: Highly flammable: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: May cause toxic effects if inhaled or absorbed through skin. Inhalation or contact with material may irritate or burn skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: Call Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-130] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-130] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-130] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. /Cymenes/ [U.S. Department of Transportation. 1996 North American Emergency

900 ppm. Respirator Class(es): Any supplied-air respirator operated in a continuous flow mode. May require eye protection. Any powered, air-purifying respirator with organic vapor cartridge(s). May require eye protection. Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s). Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 80] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Emergency or planned entry into unknown concn or IDLH conditions: Respirator Class(es): Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive pressure mode. Any supplied-air respirator that has a full face piece and is operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 80] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Condition: Escape from suddenly occurring respiratory hazards: Respirator Class(es): Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister. Any appropriate escape-type, self-contained breathing apparatus. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 80] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Notify local health and pollution control officials, and operators of nearby water intakes. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. [NIOSH. Pocket Guide to Chemical Hazards. 2nd Printing. DHHS (NIOSH) Publ. No. 85-114. Washington, D.C.: U.S.

promptly if contaminated or wet. [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 268] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

... Enclosure, local ventilation or general ventilation should be arranged to maintain atmospheric concn below safe limits. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 573] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

If concentration in air is greater than 1000 ppm, use self-contained breathing apparatus. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

500 ppm: Chemical cartridge respirator with an organic vapor cartridge(s); Supplied-air respirator; Self-contained breathing apparatus. 8000 ppm: type-C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or a full facepiece, helmet, or hood operated in continuous-flow mode. Escape: gas mask with an organic vapor canister (chin-style or front- or back-mounted canister); self-contained breathing apparatus. [Mackison, F.W., R.S. Stricoff, L.J. Partridge, Jr. (eds.). NIOSH/OSHA Pocket Guide to Chemical Hazards. DHEW (NIOSH). Publication No. 78-210. Washington, DC: U.S. Government Printing Office, 1980., p. 74] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Data indicate that cumene breaks through CPE protective materials in approximately an hour or more. [ACGIH; Guidelines Select of Chem Protect Clothing Volume #1 Field Guide p.58 (1983)] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 80] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 80] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Recommendations for respirator selection. Max concn for use: 500 ppm. Respirator Class(es): Any chemical cartridge respirator with organic vapor cartridge(s). May require eye protection. Any supplied-air respirator. May require eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 80] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Any self-contained breathing apparatus with a full facepiece. Any supplied-air respirator with a full facepiece. Recommendations for respirator selection. Max concn for use:

REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Incompatible with oxidizers. [Mackison, F.W., R.S. Stricoff, L.J. Partridge, Jr. (eds.). NIOSH/OSHA Pocket Guide to Chemical Hazards. DHEW (NIOSH). Publication No. 78-210. Washington, DC: U.S. Government Printing Office, 1980., p. 74] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Oxidizers, nitric acid, sulfuric acid, [Note: Forms cumene hydroperoxide upon long exposure to air.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 80] **QC REVIEWED**

DECOMPOSITION

Hazardous decomposition products: Toxic gases and vapors (such as carbon monoxide) may be released. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS

Vapor is heavier than air ... and may travel a considerable distance to a source of ignition and flash back. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-33] **PEER REVIEWED**

ODOR THRESHOLD

USSR: human odor perception: 0.06 mg/cu m= 0.012 ppm. [Verschueren, K. Handbook of Environmental Data of Organic Chemicals. 2nd ed. New York, NY: Van Nostrand Reinhold Co., 1983., p. 779] **PEER REVIEWED**

ODOR THRESHOLD

Detection of cumene in air 0.008 ppm. [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 41] **PEER REVIEWED**

ODOR THRESHOLD

Recognition of cumene in air 0.047 ppm. [Fazzalari, F.A. (ed.). Compilation of Odor and Taste Threshold Values Data. ASTM Data Series DS 48A (Committee E-18). Philadelphia, PA: American Society for Testing and Materials, 1978., p. 41] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

CUMENE IS CONSIDERED A PRIMARY SKIN & EYE IRRITANT ... [American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th ed. Cincinnati, OH:, p. 151] American Conference of Governmental Industrial Hygienists, 1986., p. 151] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear eye protection to prevent any reasonable probability of eye contact. ... Remove nonimpervious clothing

MA: National Fire Protection Association, 1986. 49-33] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity 0. 0= Materials which in themselves are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-33] **PEER REVIEWED**

FLAMMABLE LIMITS

Lower 0.9%; Upper 6.5% [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-33] **PEER REVIEWED**

FLASH POINT

102 Deg F (Closed cup) [Budavari, S. (ed.). The Merck Index - Encyclopedia of Chemicals, Drugs and Biologicals. Rahway, NJ: Merck and Co., Inc., 1989., p. 410] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

795 Deg F [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 819] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Foam, carbon dioxide, dry chemical ... [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 819] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

... 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 TO PROTECT MEN ATTEMPTING TO STOP LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-33] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

IF SOLN OR COATINGS CONTAINING CUMENE ARE HEATED ... IN DRYING OVEN ... EXPLOSION, READILY ... /OCCURS UNDER CERTAIN CONDITIONS/. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 572] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

Vapors form explosive mixtures with air. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-33] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Mixing cumene /with chlorosulfonic acid, nitric acid, or oleum/ in a closed container caused the temperature and pressure to increase. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-70] **PEER

vapor suppressing foam may be used to reduce vapors. Small spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

FIRE POTENTIAL

MODERATE, WHEN EXPOSED TO FLAME; IT CAN REACT WITH OXIDIZING MATERIALS. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 819] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health 2. 2= Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-33] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability 3. 3= Liquids which can be ignited under almost all normal temp conditions. Water may be ineffective because of their low flash points. Solids which form coarse dusts, solids in shredded or fibrous form that create flash fires, solids that burn rapidly, usually because they contain their own oxygen, and any material that ignites spontaneously at normal temperatures in air. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston,

firefighters' protective clothing is recommended for fire situations only; it is not effective in spill situations. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Spill: See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under "Public safety". Fire: If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: CAUTION: All these products have a very low flash point. Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Large fires: Water spray, fog or alcohol-resistant 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. Do not use straight streams. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from the ends of tanks. For massive fire use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A

1 - HSDB

NAME OF SUBSTANCE Isopropyl Benzene

CAS REGISTRY NUMBER 98-82-8

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health: Toxic; may be fatal if inhaled, ingested or absorbed through skin. Inhalation or contact with some of these materials will irritate or burn skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or explosion: Highly flammable: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion and poison hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: Call Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-131] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-131] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-131] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural

SKIN, EYE AND RESPIRATORY IRRITATIONS NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

PROTECTIVE CLOTHING & EYE PROTECTION SHOULD BE PROVIDED... [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 741] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

...TOXIC & FLAMMABLE GASES, VAPORS & DUSTS IS COUNTERED BY LOCAL EXHAUST & GENERAL VENTILATION [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 741] **PEER REVIEWED**

STABILITY/SHELF LIFE

STABLE IN DRY AIR BUT READILY OXIDIZES IN MOIST AIR FORMING "RUST" (CHIEFLY OXIDE, HYDRATED) [The Merck Index. 9th ed. Rahway, New Jersey: Merck & Co., Inc., 1976., p. 670] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS	NO DATA
STORAGE CONDITIONS	NO DATA
CLEANUP METHODS	NO DATA
DISPOSAL METHODS	NO DATA
RADIATION LIMITS AND POTENTIAL	NO DATA

1 - HSDB

NAME OF SUBSTANCE IRON

CAS REGISTRY NUMBER 7439-89-6

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

HOT IRON (WIRE) BURNS IN CHLORINE GAS. VIOLENT DECOMP OF HYDROGEN PEROXIDE (52% BY WT OR GREATER) MAY BE CAUSED BY CONTACT WITH...IRON... IRON & HYDROGEN PEROXIDE IGNITE IMMEDIATELY IF TRACE OF MANGANESE DIOXIDE IS PRESENT. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 6th ed. Boston, Mass.: National Fire Protection Association, 1975. 491M-220] **PEER REVIEWED**

FIRE POTENTIAL

MODERATE, IN FORM OF DUST WHEN EXPOSED TO HEAT OR FLAME. [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975., p. 836] **PEER REVIEWED**

FIRE POTENTIAL

CHLORINE TRIFLUORIDE REACTS WITH IRON WITH INCANDESCENCE. POWDERED IRON REACTS WITH FLUORINE BELOW REDNESS WITH INCANDESCENCE. REDUCED IRON DECOMPOSES NITROGEN DIOXIDE @ ORDINARY TEMP WITH INCANDESCENCE. REACTING MASS FORMED BY MIXTURE OF PHOSPHORUS &...IRON...CAN BECOME INCANDESCENT WHEN HEATED. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 6th ed. Boston, Mass.: National Fire Protection Association, 1975. 491M-220] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS NO DATA

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

SPECIAL MIXTURES OF DRY CHEMICAL. [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975., p. 836] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

MODERATE, IN FORM OF DUST WHEN EXPOSED TO HEAT OR FLAME. [Sax, N.I. Dangerous Properties of Industrial Materials. 4th ed. New York: Van Nostrand Reinhold, 1975., p. 836] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

WHILE STEEL PIPING, WHICH HAD HELD SULFURIC ACID IN COLD CLIMATES DURING WINTER WAS BEING REFITTED, 2 EXPLOSIONS OCCURRED; THESE WERE POSSIBLY DUE TO TRAPPED HYDROGEN FROM ACID-METAL REACTION. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 6th ed. Boston, Mass.: National Fire Protection Association, 1975. 491M-221] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES NO DATA

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

Research on Cancer, 1979., p. 8] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Vertical laminar-flow biological safety cabinets may be used for containment of in vitro procedures ... provided that the exhaust air flow is sufficient to provide an inward air flow at the face opening of the cabinet, & contaminated air plenums that are under positive pressure are leak-tight. Horizontal laminar-flow hoods or safety cabinets, where filtered air is blown across the working area towards the operator, should never be used ... Each cabinet or fume cupboard to be used ... should be tested before work is begun (eg, with fume bomb) & label fixed to it, giving date of test & avg air-flow measured. This test should be repeated periodically & after any structural changes. /Chemical Carcinogens/ [Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory:, p. 9] Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 9] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

PRECAUTIONS FOR "CARCINOGENS": Principles that apply to chem or biochem lab also apply to microbiological & cell-culture labs ... Special consideration should be given to route of admin. ... Safest method of admin volatile carcinogen is by injection of a soln. Admin by topical application, gavage, or

1 - HSDB

NAME OF SUBSTANCE	THALLIUM
CAS REGISTRY NUMBER	7440-28-0
HAZARDS SUMMARY	NO DATA
DOT EMERGENCY GUIDELINES	NO DATA
FIRE POTENTIAL	NO DATA
NFPA HAZARD CLASSIFICATION	NO DATA
FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA
FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA

REACTIVITIES & INCOMPATIBILITIES

FLUORINE ACTS SO VIGOROUSLY ON THALLIUM THAT THE METAL BECOMES INCANDESCENT. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-96] **PEER REVIEWED**

DECOMPOSITION

When heated to decomp ... emits toxic fumes of /thallium/. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2555] **QC REVIEWED**

POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA
SKIN, EYE AND RESPIRATORY IRRITATIONS	NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Wear boots, protective gloves, and goggles. If contact with this material is anticipated, wear full protective clothing. /Thallium salt, solid, not otherwise specified/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 677] Hazardous Materials Systems (BOE), 1987., p. 677] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent skin contact with soluble thallium compounds where skin contact may occur. Employees should be provided with and required to use dust and splash proof safety goggles where soluble thallium compounds may contact the eyes. /Thallium and thallium compounds/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 5] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 5] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Persons ... should wear ... protective equipment, & resp

protective equipment ... where there is a possibility of ... inhalation of airborne dust. A complete set of working clothes is essential; these clothes should be kept in accommodations separate from that employed for ordinary clothes. /Thallium and compounds/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 2171] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

WHEN THALLIUM ... /IS/ USED, STRICTEST SAFETY PRECAUTIONS ... /SHOULD BE/ TAKEN TO ENSURE THAT CONCN IN WORKPLACE AIR IS KEPT BELOW PERMISSIBLE LIMITS & SKIN CONTACT IS PREVENTED. /THALLIUM AND CMPD/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 2171] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

If material not involved in fire: keep material out of water sources and sewers. /Thallium and cmpd/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 677] Hazardous Materials Systems (BOE), 1987., p. 677] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Avoid breathing dusts and fumes from burning material and keep upwind. Avoid bodily contact and 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. /Thallium and cmpd/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 677] Hazardous Materials Systems (BOE), 1987., p. 677] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Where thallium compounds must be used, strict safety precautions should be observed to prevent ingestion, inhalation or skin contact. Food, drink and cigarettes ... prohibited at the work site. /Thallium and thallium compounds/ [Friberg, L., Nordberg, G.F., Kessler, E. and Vouk, V.B. (eds). Handbook of the Toxicology of Metals. 2nd ed. Vols I, II.: Amsterdam: Elsevier Science Publishers B.V., 1986. V2 564] **PEER REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS

No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./ [49 CFR 171.2 (7/1/96)] **QC REVIEWED**

SHIPMENT METHODS AND REGULATIONS

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes

dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article. [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.6235 (1988)] **QC REVIEWED**

STORAGE CONDITIONS NO DATA

CLEANUP METHODS

1. Ventilate area of spill. ... 2. For small quantities, sweep onto paper or other suitable material, place in sealed container for disposal. Large quantities may be reclaimed; However, if this is not practical, collect spilled material in the most convenient & safe manner & deposit in sealed containers for disposal. 3. Liquids containing sol thallium compounds may be absorbed in vermiculite, dry sand, earth, or a similar material & deposited in sealed containers for disposal. /Thallium and thallium cmpd/ [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.] **PEER REVIEWED**

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Reuse: Return to the suppliers. Recommendable methods: Solidification, & landfill. Not recommendable method: Thermal destruction. Peer review: Convert sol cmpd to insol form, solidify and landfill. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 289] **QC REVIEWED**

RADIATION LIMITS AND POTENTIAL

(204)Tl isotope has a radiological half-life of 3 years, a readily detectable beta emission, and a 70 keV photon owing to K-electron capture. [USEPA; Ambient Water Quality Criteria Doc: Thallium p.C-7 (1980) EPA 440/5-80-074] **PEER REVIEWED**

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305

Phone: (518) 385-4085 DIAL COMM 8*235-4085

MATERIALS INFORMATION SERVICES

NO. 317

TOLUENE

Revision C

Date August 1979

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: TOLUENE

OTHER DESIGNATIONS: Toluol, Methylbenzene, Phenylmethane, $CH_3C_6H_5$, GE Material D5B11, ASTM D362 and D841, CAS# 000 108 883

MANUFACTURER: Available from many suppliers, including Shell Chemical Co. and Sun Oil Co.

SECTION II. INGREDIENTS AND HAZARDS

SECTION II. INGREDIENTS AND HAZARDS	%	HAZARD DATA
Toluene	ca 100	8-hr TWA 100 ppm (skin)* or 375 mg/m^3 Human, inhalation TCLo 200 ppm (central nervous syst.) Rat, inhalation LCLo 4000 ppm/4 hr Rat, oral LD_{50} 5000 mg/kg

*ACGIH (1978); (skin) notation indicates a potential contribution to overall exposure via skin absorption. OSHA/NIOSH (1976) proposed an 8-hr TWA of 100 ppm, with a 15 minute ceiling of 200 ppm, and an action level of 50 ppm. Current OSHA TLV is 200 ppm.

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F (C)	231 (110.6)	Specific gravity (Water=1)	0.866
Vapor pressure @ 25 C, mm Hg	28	Volatiles, %	100
Vapor density (Air=1)	3.2	Evaporation rate (BuAc=1)	1.9
Solubility in water, %	0.05	Molecular weight	92.15

Appearance & Odor: Water white liquid with a characteristic aromatic odor, whose recognition threshold (unfatigued) is 2-5 ppm (100% of test panel). Odor detection is unsatisfactory for safety because of fatigue.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air % by volume LOWER	UPPER
40 F (4.4 C) Closed cup	(536 C) 997 F	1.2	7

Extinguishing Media: Carbon dioxide, dry chemical, foam, and water fog. Water may be ineffective for putting out fire, but use spray to cool fire-exposed containers.

At room temperature, toluene emits vapors that can form flammable mixtures with air. It is a dangerous fire hazard and a moderate explosion hazard when exposed to heat and flame. Vapors can flow along surfaces to distant ignition sources, then flash back.

Firefighters should wear self-contained breathing apparatus and eye protection when fighting toluene fires.

SECTION V. REACTIVITY DATA

Toluene is a stable material under normal storage and handling. It does not undergo hazardous polymerization.

Since toluene is a flammable liquid, avoid contact with heat, sparks or open flames. Avoid contact with strong oxidizing agents. Nitric acid and toluene, especially in combination with sulfuric acid, will produce nitrated compounds which are dangerously explosive.

Oxidation in air can form oxides of carbon and nitrogen.

Copyright © — 1979 By General Electric Company

SECTION VI. HEALTH HAZARD INFORMATION

TLV 100 ppm (skin) (See Sect. II)

Vapor inhalation can produce headache and slight drowsiness at 100 ppm, fatigue, nausea and itching skin at 100-200 ppm, anesthetic effects and respiratory tract and eye irritation above 200 ppm. Absorption can occur through the skin, and liquid contact will cause defatting of the skin, with possible dermatitis from repeated or prolonged contact. Eye contact is irritating and can be damaging (corneal burns). Ingestion irritates the digestive tract and results in systemic effects from absorption.

FIRST AID:

Eye Contact: Immediately irrigate with water for 15 minutes. Get medical help.

Skin Contact: Wash area with soap & water; remove contaminated clothing promptly. Get medical help if irritation persists or if large areas of skin were exposed.

Inhalation: Remove to fresh air; restore breathing and give oxygen if needed. Get medical help!

Ingestion: Get medical help as soon as possible! When victim is conscious, give USP mineral oil to drink. (Aspiration is a potential hazard if vomiting occurs!)

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Report large spills to safety personnel. Remove ignition sources; provide explosion-proof ventilation. Those involved in clean-up must use protection again liquid contact and vapor inhalation. Pick as liquid when feasible, or absorb on vermiculite or sand and scoop up with nonsparking tools into a metal container with cover. Liquid can be flushed with a water spray to an open holding area for handling. Do not flush to sewer, to a confined space, or to a watercourse!

DISPOSAL: Consider reclaiming by distillation or disposal via a licensed waste disposal company. Scrap may be incinerated under properly controlled conditions. Follow Federal, State and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and exhaust ventilation to meet TLV requirements. Ventilation fans & other electrical service must be nonsparking and explosion proof. Exhaust hoods should have >100 lfm face velocity and be designed to capture heavy vapors. Exposure above the TLV for nonroutine and emergency situations requires use of an organic chemical cartridge respirator up to 200 ppm; above 200 ppm a full face piece is required with an approved canister-type gas mask or self-contained breathing equipment.

Safety goggles or glasses should be worn in areas of use. Impermeable (neoprene has been recommended) gloves and apron, face shield, and other protective clothing may be needed to prevent skin contact during use, especially where splashing may occur. An eyewash station should be available if splashing is possible. A safety shower and washing facilities should be available.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store in cool, clean, well-ventilated area away from sources of heat and ignition and away from oxidizing agents. Area must meet requirements of OSHA Class IB liquid. No smoking in areas of storage or use. Nonsparking tools should be used near toluene. Use safety cans for handling small amounts. Ground and bond metal containers for liquid transfers to prevent static sparks. Protect containers from physical damage.

Preplacement and periodic medical exams emphasizing the liver, kidneys, nervous system, lungs, heart and blood should be provided. At least an annual exam is recommended for workers exposed above the action level (50 ppm). Use of alcohol can aggravate the narcotic effect and blood effects of toluene.

DATA SOURCE(S) CODE: 1-9,12,20,21,24,26

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Nevertheless, although reasonable care has been taken in the preparation of such information, General Electric Company makes no warranties, express or implied, concerning the suitability or the accuracy or sufficiency of such information for purchaser's purposes, nor does it assume any liability for the consequences of its use.

APPROVALS: MIS, CRD

Industrial Hygiene and Safety

MEDICAL REVIEW: 12/79

1 - HSDB

NAME OF SUBSTANCE 1,2,4-TRICHLOROBENZENE

CAS REGISTRY NUMBER 120-82-1

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Health Hazards: Poisonous if swallowed. May be poisonous if inhaled. Contact may cause burns to skin and eyes. Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution. /Trichlorobenzene, liquid/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-54] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire or Explosion: Some of these materials may burn, but none of them ignites readily. /Trichlorobenzene, liquid/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-54] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. If water pollution occurs, notify the appropriate authorities. /Trichlorobenzene, liquid/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-54] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Small Fires: Dry chemical, CO2, water spray or regular foam. Large Fires: Water spray, fog or regular foam. Move container from fire area if you can do it without risk. /Trichlorobenzene, liquid/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-54] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or Leak: Do not touch or walk through spilled material; stop leak if you can do it without risk. Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Small Dry Spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area. Large Spills: Dike far ahead of liquid spill for later disposal. /Trichlorobenzene, liquid/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P 5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-54] **PEER REVIEWED**

DOT EMERGENCY GUIDELINES

First Aid: Move victim to fresh air; call emergency medical care. 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. /Trichlorobenzene, liquid/ [U.S. Department of Transportation. Emergency Response Guidebook 1990. DOT P

5800.5. Washington, DC: U.S. Government Printing Office, 1990. G-54] **PEER REVIEWED**

FIRE POTENTIAL

SLIGHT, WHEN EXPOSED TO HEAT OR FLAME. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2618] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 2. 2= Materials that, on intense or continued (but not chronic) exposure, could cause temporary incapacitation or possible residual injury, including those requiring the use of respiratory protective equipment that has an independent air supply. These materials are hazardous to health, but areas may be entered freely if personnel are provided with full-face mask self-contained breathing apparatus that provides complete eye protection. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-88] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 1. 1= Includes materials that must be preheated before ignition will occur, such as Class IIIB combustible liquids and solids and semi-solids whose flash point exceeds 200 deg F (93.4 deg C), as well as most ordinary combustible materials. Water may cause frothing if it sinks below the surface of the burning liquid and turns to steam. However, a water fog that is gently applied to the surface of the liquid will cause a frothing which will extinguish the fire. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-88] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-88] **PEER REVIEWED**

FLAMMABLE LIMITS

Lower Flammable Limit: 2.5% by vol, Upper Flammable Limit: 6.6% by vol at 302 deg F (150 deg C) [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-88] **PEER REVIEWED**

FLASH POINT

105 deg C (222 deg F) (Closed cup) [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-88] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

571 deg C (1060 deg C) [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-88] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

WATER, FOAM, CARBON DIOXIDE, DRY CHEM. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association,

1991., p. 2618] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Water may be used to blanket fire. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-88] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL NO DATA

REACTIVITIES & INCOMPATIBILITIES

... ON CONTACT WITH ACIDS OR ACID FUMES THEY EVOLVE HIGHLY TOXIC CHLORIDE FUMES. /CHLORIDES/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 672] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... CAN REACT VIGOROUSLY WITH OXIDIZING MATERIALS. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2618] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Acids, acid fumes, oxidizers, steam. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 314] **QC REVIEWED**

DECOMPOSITION

WHEN HEATED TO DECOMP, IT EMITS ACRID SMOKE AND FUMES. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2741] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

INDUSTRIAL DATA REPORT AN ODOR THRESHOLD OF APPROX 3 PPM ... [American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th ed. Cincinnati, OH:, p. 593] American Conference of Governmental Industrial Hygienists, 1986., p. 593] **PEER REVIEWED**

ODOR THRESHOLD

Low odor threshold= 24.0 mg/cu m; High odor threshold= 24.0 mg/cu m; Irritating concn= 40.0 mg/cu m [Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

CUTANEOUS EXPOSURE TO 1,2,4-TRICHLOROBENZENE ... CAN CAUSE DERMAL IRRITATION ... INDUSTRIAL DATA REPORT ... MINIMAL EYE & THROAT IRRITATION AT 3-5 PPM IN CERTAIN PEOPLE. [American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th ed. Cincinnati, OH:, p. 593] American Conference of Governmental Industrial Hygienists, 1986., p. 593] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Solid 1,2,4-trichlorobenzene ... is irritating & causes severe pain on contact with eyes. [Grant, W.M. Toxicology of the Eye. 3rd ed. Springfield, IL: Charles C. Thomas Publisher, 1986., p.

934] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Chlorinated benzenes are irritating to the skin, conjunctiva, and mucous membranes of the upper respiratory tract. ... /Chlorinated benzenes/ [Sittig, M. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985. 2nd ed. Park Ridge, NJ: Noyes Data Corporation, 1985., p. 879] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 314] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 314] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Contact lenses should not be worn when working with this chemical. /Chlorobenzene/ [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 64] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 314] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 314] **QC REVIEWED**

OTHER PREVENTIVE MEASURES

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. [CITATION] **QC REVIEWED**

STABILITY/SHELF LIFE

STABLE AT ROOM TEMP [American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit

1 - HSDB

NAME OF SUBSTANCE TRICHLOROFLUOROMETHANE

CAS REGISTRY NUMBER 75-69-4

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL NO DATA

NFPA HAZARD CLASSIFICATION NO DATA

FLAMMABLE LIMITS

Non-flammable [Budavari, S. (ed.). The Merck Index - Encyclopedia of Chemicals, Drugs and Biologicals. Rahway, NJ: Merck and Co., Inc., 1989., p. 1517] **PEER REVIEWED**

FLASH POINT NO DATA

AUTOIGNITION TEMPERATURE NO DATA

FIRE FIGHTING PROCEDURES

If material involved in fire: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty). Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. /Refrigerants NEC, gas or liquid, nonflammable (refrigerant, gas, NOS or dispersant gas, NOS/ [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, D.C.: Assoc. of American Railroads,, p. 599] Hazardous Materials Systems (BOE), 1987., p. 599] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

WHEN HEATED TO DECOMP, IT EMITS HIGHLY TOXIC FUMES OF FLUORIDE & CHLORIDE IONS. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2623] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

ALL FLUOROCARBONS WILL UNDERGO THERMAL DECOMPOSITION WHEN EXPOSED TO FLAME OR RED-HOT METAL. DECOMPOSITION PRODUCTS OF THE CHLOROFLUOROCARBONS WILL INCLUDE HYDROFLUORIC & HYDROCHLORIC ACID ALONG WITH SMALLER AMOUNTS OF PHOSGENE & CARBONYL FLUORIDE. THE LAST COMPOUND IS VERY UNSTABLE TO HYDROLYSIS & QUICKLY CHANGES TO HYDROFLUORIC ACID & CARBON DIOXIDE IN THE PRESENCE OF MOISTURE. /FLUOROCARBONS/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 897] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

IN CONTACT WITH OPEN FLAME OR VERY HOT SURFACE FLUOROCARBONS MAY DECOMP INTO HIGHLY IRRITANT & TOXIC GASES: CHLORINE, HYDROGEN FLUORIDE OR CHLORIDE, & EVEN PHOSGENE. /FLUOROCARBON REFRIGERANT & PROPELLANTS/ [Gosselin, R.E., R.P. Smith, H.C. Hodge. Clinical Toxicology of Commercial Products. 5th ed. Baltimore: Williams and Wilkins, 1984. II-159] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

UNDER CERTAIN CONDITIONS, FLUOROCARBON VAPORS MAY DECOMPOSE ON CONTACT WITH FLAMES OR HOT SURFACES, CREATING THE POTENTIAL HAZARD OF INHALATION OF TOXIC DECOMPOSITION PRODUCTS. /FLUOROCARBONS/ [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p.

3101] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

... SENSITIVITY TESTS HAVE SHOWN THAT LITHIUM SHAVINGS IN CONTACT WITH MONOFLUOROTRICHLOROMETHANE ... CAN DETONATE. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 491M-118] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Chemically active metals such as sodium, potassium, calcium, powdered aluminum, zinc, magnesium & lithium shavings, and granular barium. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 146] **QC REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Granular barium in contact with fluorotrichloromethane ... is susceptible to detonation. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 78] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Mixtures of lithium shavings and several halocarbon derivatives /including fluorotrichloromethane/ are impact-sensitive and will explode, sometimes violently. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1261] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Reacts violently with aluminum and lithium. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2623] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Dangerous ... on contact with acid or acid fumes, they emit highly toxic fumes. /Fluorides/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 541] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

DANGEROUS ... ON CONTACT WITH ACIDS OR ACID FUMES THEY EVOLVE HIGHLY TOXIC CHLORIDE FUMES. /CHLORIDES/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 966] **PEER REVIEWED**

DECOMPOSITION

Decomposes into harmful materials by flames or high heat. [Budavari, S. (ed.). The Merck Index - Encyclopedia of Chemicals, Drugs and Biologicals. Rahway, NJ: Merck and Co., Inc., 1989., p. 1517] **PEER REVIEWED**

DECOMPOSITION

UNDER CERTAIN CONDITIONS, FLUOROCARBON VAPORS MAY DECOMPOSE ON CONTACT WITH FLAMES OR HOT SURFACES, CREATING THE POTENTIAL HAZARD OF INHALATION OF TOXIC DECOMPOSITION PRODUCTS. /FLUOROCARBONS/ [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 3101] **PEER REVIEWED**

DECOMPOSITION

Dangerous; When heated to decomp ... they evolve highly toxic

/hydrogen/ chloride fumes. /Chlorides/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 966] **PEER REVIEWED**

DECOMPOSITION

Dangerous; when heated to decomp ... they emit highly toxic fumes. /Fluorides/ [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 966] **PEER REVIEWED**

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD

Low: 28.0 mg/cu m; High: 1170.4 mg/cu m [Ruth JH; Am Ind Hyg Assoc J 47: A-142-51 (1986)] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

Immediately irritating to the eye. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS(NIOSH) Publication No. 90-117. Washington, DC: U.S. Government Printing Office, June 1990, p. 116] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

AIR LINE RESPIRATOR; RUBBER GLOVES; MONOGOGGLES. [U.S. Coast Guard, Department of Transportation. CHRIS - Hazardous Chemical Data. Volume II. Washington, D.C.: U.S. Government Printing Office, 1984-5.] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Employees should be provided with and required to use impervious clothing, gloves, face-shields (eight-inch minimum), and other appropriate protective clothing necessary to prevent repeated or prolonged of skin contact with liquid fluorotrichloromethane. Employees should be provided with and required to use splash-proof goggles where liquid fluorotrichloromethane may contact the eyes. [Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication, p. 2] No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981., p. 2] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 146] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 146] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Eyewash fountains should be provided in areas where there is any possbility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 146] **QC REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Facilities for quickly drenching the body should be provided

within the immediate work area for emergency use where there is a possibility of exposure. [Note: It is intended that these facilities should provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available, whereas in others, the availability of water from a sink or hose could be considered adequate.] [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS

1 - HSDB

NAME OF SUBSTANCE 1,2,4-TRIMETHYLBENZENE

CAS REGISTRY NUMBER 95-63-6

HAZARDS SUMMARY

The major hazards encountered in the use and handling of 1,2,4-trimethylbenzene stem from its toxicologic properties. Toxic by inhalation and dermal contact, exposure to this liquid may occur from its use as a solvent and paint thinner, and in the manufacture of dyes, perfumes, resins, pharmaceuticals, and trimellitic anhydride. Effects from exposure may include headache, fatigue, nausea, irritation of the skin, eyes, and mucous membranes, central nervous system depression, asthmatic bronchitis, chemical pneumonitis, or pulmonary edema. If contact should occur, irrigate exposed eyes with copious amounts of tepid water for at least 15 minutes, and wash exposed skin thoroughly with soap and water. While this substance must be moderately heated before ignition will occur (autoignition temperature: 932 deg F), caution should be taken to prevent its heavier-than-air vapor from accumulating to flammable concentrations (flammable limits: 0.9% to 6.4%). Water spray may be used to extinguish fires involving this substance. [CITATION] **QC REVIEWED**

DOT EMERGENCY GUIDELINES NO DATA

FIRE POTENTIAL

MODERATE FIRE RISK. [Sax, N.I. and R.J. Lewis, Sr. (eds.). Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987., p. 978] **PEER REVIEWED**

FIRE POTENTIAL

IN ABSENCE OF PRECAUTIONS, FLAMMABLE CONCN OF VAPOR MAY BE PRESENT WHERE LIQUIDS ARE USED IN SOLVENT & THINNER OPERATIONS. /TRIMETHYL BENZENE/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1067] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 0. 0= Materials that on exposure under fire conditions, offer no hazard beyond that of ordinary combustible material. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 2. 2= Includes materials that must be moderately heated before ignition will occur and includes Class II and IIIA combustible liquids and and solids and semi-solids that readily give off ignitible vapors. Water spray may be used to extinguish fires in these materials because the materials can be cooled below their flash points. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection

Association, 1991. 325M-90] **PEER REVIEWED**

FLAMMABLE LIMITS

0.9%-6.4% (BY VOL) [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

FLASH POINT

112 DEG F (44 DEG C) (CLOSED CUP) [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

932 DEG F (500 DEG C) [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 325M-90] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES	NO DATA
TOXIC COMBUSTION PRODUCTS	NO DATA
OTHER FIRE FIGHTING HAZARDS	NO DATA
EXPLOSIVE LIMITS AND POTENTIAL	NO DATA

REACTIVITIES & INCOMPATIBILITIES

Oxidizers, nitric acid. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

DECOMPOSITION	NO DATA
POLYMERIZATION	NO DATA
OTHER HAZARDOUS REACTIONS	NO DATA
ODOR THRESHOLD	NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

LIQUID SOLVENT IS PRIMARY SKIN IRRITANT ... /TRIMETHYL BENZENE/ [American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th ed. Cincinnati, OH:, p. 608] American Conference of Governmental Industrial Hygienists, 1986., p. 608] **PEER REVIEWED**

SKIN, EYE AND RESPIRATORY IRRITATIONS

RESP IRRITANT. [Budavari, S. (ed.). The Merck Index - Encyclopedia of Chemicals, Drugs and Biologicals. Rahway, NJ: Merck and Co., Inc., 1989., p. 1258] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

The worker should immediately wash the skin when it becomes contaminated. [NIOSH. NIOSH Pocket Guide to Chemical Hazards.

DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Work clothing that becomes wet or significantly contaminated should be removed or replaced. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

STABILITY/SHELF LIFE NO DATA

SHIPMENT METHODS AND REGULATIONS NO DATA

STORAGE CONDITIONS

STORAGE TANKS SHOULD BE MOUNDED TO CONFINE ESCAPING LIQUID & ESCAPE FROM PROCESS VESSELS SHOULD BE CONTROLLED IN SIMILAR MANNER BY SILLS @ DOORWAYS, DESIGN OF FLOORS, ETC. /TRIMETHYLBENZENES/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 692] **PEER REVIEWED**

CLEANUP METHODS NO DATA

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable

1 - HSDB

NAME OF SUBSTANCE 1, 3, 5 - TRIMETHYLBENZENE

CAS REGISTRY NUMBER 108-67-8

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or explosion: Highly flammable: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Some may polymerize (P) explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health: May cause toxic effects if inhaled or absorbed through skin. Inhalation or contact with material may irritate or burn skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Public safety: Call Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Protective clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial

Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Evacuation: Large spill: Consider initial downwind evacuation for at least 300 meters (1000 feet). Fire: If tank, rail car or tank truck is involved in a fire, isolate for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Caution: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient. Small fires: Dry chemical, CO2, water spray or alcohol-resistant foam. Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane. Large fires: Water spray, fog or alcohol-resistant foam. Do not use straight streams. Move containers from fire area if you can do it without risk. Fire involving tanks or car/trailer loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or leak: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large spills: Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders

During the Initial Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. [U.S. Department of Transportation. 1996 North American Emergency Response Guidebook. A Guidebook for First Responders During the Initial Phase of a G-129] Hazardous Materials/Dangerous Goods Incident. U.S. Department of Transportation (U.S. DOT) Research and Special Programs Administration, Office of Hazardous G-129] Materials Initiatives and Training (DHM-50), Washington, D.C. (1996). G-129] **QC REVIEWED**

FIRE POTENTIAL

MODERATE, VIA HEAT, FLAMES, OXIDIZERS [Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Rheinhold, 1979., p. 799] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Health: 0. 0= Materials that on exposure under fire conditions, offer no hazard beyond that of ordinary combustible material. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Flammability: 2. 2= Includes materials that must be moderately heated before ignition will occur and includes Class II and IIIA combustible liquids and and solids and semi-solids that readily give off ignitible vapors. Water spray may be used to extinguish fires in these materials because the materials can be cooled below their flash points. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

Reactivity: 0. 0= Includes materials that are normally stable, even under fire exposure conditions, and that do not react with water. Normal fire fighting procedures may be used. [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

FLAMMABLE LIMITS NO DATA

FLASH POINT

122 DEG F (50 DEG C) (CLOSED CUP) [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991.

325M-90] **PEER REVIEWED**

AUTOIGNITION TEMPERATURE

1039 DEG F (559 DEG C) [National Fire Protection Guide. Fire Protection Guide on Hazardous Materials. 10 th ed. Quincy, MA: National Fire Protection Association, 1991. 325M-90] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

If material on fire or involved in fire: Do not extinguish fire unless flow can be stopped or safely confined. 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 foam, dry chemical, or carbon dioxide. Keep run-off water out of sewers and water sources. [Association of American Railroads. Emergency Handling of Hazardous Materials in Surface Transportation. Washington, DC: Association of American Railroads, Bureau of Explosives, 1994., p. 1087] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS NO DATA

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

...RISK OF...EXPLOSION REQUIRES THAT CONCN OF VAPOR IN ATMOSPHERE IS KEPT BELOW 35-50 PPM BY MEANS OF EFFECTIVE VENTILATION OR, PREFERABLY, LOCAL APPLIED EXHAUST VENTILATION. /TRIMETHYLBENZENES/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 692] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Oxidizers, nitric acid. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS NO DATA

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate personal protective clothing to prevent skin contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear appropriate eye protection to prevent eye contact. [NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 94-116. Washington, D.C.: U.S. Government Printing Office, June 1994., p. 320] **PEER REVIEWED**

AN ACCESSION NUMBER: 3305. 9112.
CN CHEMICAL NAME: XYLENE.
SY SYNONYMS: DIMETHYLBENZENE. BENZENE, DIMETHYL-. XYLOL. DILAN.
NCI-C55232. UN 1307. STCC 4904350. RCRA U239.
RN CAS NUMBER: 1330-20-7.

REG. TOXIC NUMBER: ZE2100000.

CHEMICAL FORMULA: C8H10.
PD
PHYSICAL DESCRIPTION:
LIGHT-COLORED OR COLORLESS, MOBILE LIQUID WITH AN AROMATIC ODOR.

MOL WT:	106.16
BOILING PT:	280-291 F (138-144C)
SOLUBILITY:	0.00003%
FLASH PT:	81-90 F (27-32 C)
VAPOR PRES:	7-9 MMHG
MELT PT:	-54-55 F (-48-13 C)
UEL IN AIR:	7%
LEL IN AIR:	1.0%
MEC IN AIR:	867-984 F (464-529C)
SPEC GRAVITY:	0.86

C:\PCPLUS\97800 01/31/92

VAPOR DENSITY: 3.7
ODOR THRESHOLD: 0.5 PPM
OCTANOL/WATER CO-EFFICIENT:.

EL

PERMISSABLE EXPOSURE:
100 PPM OSHA TWA; 150 PPM OSHA STEL
100 PPM ACGIH TWA
150 PPM ACGIH STEL
100 PPM NIOSH RECOMMENDED TWA
150 PPM NIOSH RECOMMENDED STEL
REPRODUCTIVE EFFECTS DATA (RTECS)
AQUATIC TOXICITY RATING 2 (TLM96 10 - 100 PPM)
TLM96 - BLUEGILL 20.87 PPM, FATHEAD 26.7-28.77 PPM, GUPPIES 34.37 PPM
KILL, 1HR - LEPOMIS HUMILIS 47.48 PPM
TLM24 DAPHNIA MAGNA >100 - <1000 PPM
CERCLA HAZARD RATINGS - TOXICITY 2 - IGNITABILITY 3 - REACTIVITY 0 - PERSISTENCE 1
TOXICOLOGY: XYLENE IS AN EYE, SKIN AND MUCOUS MEMBRANE IRRITANT. IT IS MODERATELY TOXIC BY INHALATION AND INGESTION. IT IS A CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE LIVER AND KIDNEYS CONCENTRATIONS OF 200 PPM MAY RESULT IN IRRITATION OF THE UPPER RESPIRATORY TRACT. INITIALLY, CENTRAL NERVOUS SYSTEM EXCITATION MAY OCCUR FOLLOWED BY DEPRESSION WITH TRANSIENT EUPHORIA, EMOTIONAL INSTABILITY, DROWSINESS AND ATAXIA. A GROUP OF SUBJECTS WHO INHALED 12.3 UMOL/L OF XYLENE WHILE EXERCISING BECAME SIGNIFICANTLY IMPAIRED ON 3 NEUROPSYCHOLOGICAL TESTS. PROLONGED EXPOSURE TO VAPORS ABOVE 200 PPM MAY LEAD TO NAUSEA, VOMITING, ABDOMINAL PAIN AND ANOREXIA. WOMEN MAY DEVELOP MENSTRUAL DISORDERS, INFERTILITY AND PATHOLOGICAL PREGNANCY CONDITIONS.
PREGNANT WOMEN MAY BE AT AN INCREASED RISK FROM EXPOSURE.
ALCOHOLIC BEVERAGES MAY ENHANCE THE TOXIC EFFECTS. STIMULANTS SUCH AS EPINEPHRINE OR EPHEDRINE MAY INCUDE VENTRICULAR FIBRILLATION.
IHL-MAN LCLO: 10,000 PPM/6 HR IHL-HMN TCLO: 200 PPM
ORL-HMN LDLO: 50 MG/KG ORL-RAT LD50: 4300 MG/KG
IHL-RAT LD50: 5000 PPM/4 HR SCU-RAT LD50: 1700 MG/KG
IPR-RAT LD50: 2459 MG/KG IPR-MUS LD50: 1548 MG/KG
SKIN AND EYE IRRITATION DATA (RTECS)
EYE-HMN 200 PPM SKN-RBT 100% MOD
SKN-RBT 500 MG/24 HR MOD EYE-RBT 87 MG MLD

OSHA STANDARD 1910.1200 HAZARD COMMUNICATION REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING, MATERIAL SAFETY DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

DANGEROUS EXPOSURE:
1000 PPM OSHA/NIOSH
LIGHT-COLORED OR COLORLESS, MO.

IC

INCOMPATIBILITIES:
NITRIC ACID. STRONG OXIDIZERS. PLASTICS. RUBBER. HYDROGEN SULFIDE.
VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT!.

CL

CLOTHING:
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES

CHEMICAL HAZARDS":
EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE APPROPRIATE PROTECTIVE CLOTHING AND EQUIPMENT NECESSARY TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE. FACE SHIELDS SHALL COMPLY WITH 29CFR1910.133(A)(2), (A)(4), (A)(5), AND (A)(6).
EMPLOYERS SHALL ENSURE THAT CLOTHING CONTAMINATED WITH THIS SUBSTANCE PLACED IN CLOSED CONTAINERS FOR STORAGE UNTIL IT CAN BE DISCARDED OR UNTIL THE EMPLOYER PROVIDES FOR THE REMOVAL OF THE CONTAMINANT FROM TH CLOTHING. IF THE CLOTHING IS TO BE LAUNDERED OR OTHERWISE CLEANED TO REMOVE THE CONTAMINANT, THE EMPLOYER SHALL INFORM THE PERSON PERFORMIN THE CLEANING OF THE HAZARDOUS PROPERTIES OF THE SUBSTANCE.
-ACGIH "GUIDELINES FOR THE SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATED THE FOLLOWING PROTECTIVE RATINGS FOR MATERIALS COMMONLY USED FOR PROTECTIVE CLOTHING. THESE RATINGS ARE BASED PRIMARILY ON QUANTITATIVE TEST RESULTS AND QUALITATIVE RESISTANCE INFORMATION. (THE RECOMMENDATIONS APPLY TO THE PURE SUBSTANCE ONLY; BREAKTHROUGH-TIME MA VARY FOR MIXTURES.) (A "+" DESIGNATES A BLEND OF MATERIALS, WHILE A "/ DESIGNATES A COATED OR LAMINATED MATERIAL.) -
XYLENE: EXCELLENT/GOOD: POLYVINYL ALCOHOL GOOD/FAIR: VITON/NEOPRENE VI TEFLON POOR/FAIR: BUTYL CHLORINATED POLYETHYLENE BUTYL/NEOPRENE STYRENE-BUTADIENE RUBBER POOR: NATURAL RUBBER NEOPRENE NITRILE + POLYVINYL ALCOHOL NITRILE POLYETHYLENE POLYVINYL CHLORIDE NEOPRENE + NATURAL RUBBER NEOPRENE/NATURAL RUBBER.

WEAR EYE PROTECTION TO PREVENT:
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES CHEMICAL HAZARDS":
EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE SPLASH-PROOF SAF GOGGLES WHICH COMPLY WITH 29CFR1910.133(A)(2)-(A)(6) WHERE THIS LIQUID MAY CONTACT THE EYES.

EMPLOYEE SHOULD WASH:
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES CHEMICAL HAZARDS":
EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE SKIN BECOMES CONTAMINATED WITH THIS SUBSTANCE PROMPTLY WASH OR SHOWER WITH SOAP OR MILD DETERGEN AND WATER TO REMOVE ANY CONTAMINANT FROM THE SKIN.
EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHO HANDLE THIS SUBSTANCE WASH THEIR HANDS THOROUGHLY WITH SOAP OR MILD DETERGENT AND WATER BEFORE EATING, SMOKING, OR USING TOILET FACILITIES.

WORK CLOTHING SHOULD BE CHANGED DAILY:
NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE CONTAMINANT AND THE EXTENT OF EXPOSURE, CHANGE INTO UNCONTAMINATED CLOTHING BEFORE LEAVING THE WORK PREMISES.

REMOVE CLOTHING:
FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES CHEMICAL HAZARDS":
EMPLOYERS SHALL ENSURE THAT ANY CLOTHING WHICH BECOMES WET WITH THIS FLAMMABLE LIQUID BE REMOVED IMMEDIATELY AND NOT REWORN UNTIL THE SUBSTANCE IS REMOVED FROM THE CLOTHING.

THE FOLLOWING EQUIPMENT SHOULD BE AVAILABLE:
NO SPECIFIC REQUIREMENT. IF INDICATED BY THE NATURE OF THE SUBSTANCE A THE PROBABILITY OF EXPOSURE, PROVIDE AN EYE WASH AND FACILITIES FOR QU DRENCHING OF THE BODY WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

C:\PCPLUS\97800 01/31/92
RESPIRATOR SELECTION (UPPER LIMIT DEVICES PERMITTED):
1000 PPM
- CHEMICAL CARTRIDGE RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDG
- POWERED AIR-PURIFYING RESPIRATOR WITH AN ORGANIC VAPOR CARTR
- SUPPLIED-AIR RESPIRATOR
- SELF-CONTAINED BREATHING APPARATUS

ESCAPE
- GAS MASK WITH AN ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONT
BACK-MOUNTED CANISTER)
- APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE
OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY
SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE

MS
MEDICAL SURVEILLANCE:
GENERAL MEDICAL HISTORY.
EKG RECOMMENDED IF EMPLOYEE TO WEAR FULL-FACE RESPIRATOR.
40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES
CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT TOX
SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES MANUFACTURER
AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP
RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30
YEARS.
PHYSICIAN PRE-PLACEMENT AND ANNUAL EXAMS.
MEDICAL WARNING FOR REFUSAL OF MEDICAL EXAMINATION.
OSHA: CENTRAL NERVOUS SYSTEM TESTS, PERIPHERAL NEUROPATHY.
VISION TEST.
EYE DISEASE.
GASTROINTESTINAL.
LIVER FUNCTION.
KIDNEY FUNCTION.
SKIN EXAM.
COMPLETE BLOOD COUNT.
URINALYSIS.
ACGIH BIOLOGICAL EXPOSURE INDICES FOR XYLENES: 1.5 G/G CREAT.
METHYLHIPPURIC ACIDS IN URINE /TIMING-END OF SHIFT 2 MG/MIN
METHYLHIPPURIC ACIDS IN URINE /TIMING--LAST 4 HRS OF SHIF.
29CFR1910.20 OSHA STANDARD SUBPART C - GENERAL SAFETY AND HEALTH
PROVISIONS PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSH
ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS RELEVANT
EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL PHYSICAL AGENTS.
53FR38140 9/29/88 (AMENDED).

RE
ROUTE OF ENTRY:
INHALATION. SKIN ABSORPTION. INGESTION. SKIN OR EYE CONTACT.

TO
TARGET ORGANS:
CENTRAL NERVOUS SYSTEM. EYES. GASTROINTESTINAL. BLOOD. LIVER. SK
KIDNEYS. RESPIRATORY SYSTEM.

SP
SYMPTOMS:
SKIN, COVERING OF BODY (SC0174);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090).

EYE, ORGAN OF SIGHT (SC0170);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090).
MUCOUS MEMBRANE, MEMBRANE LINING PASSAGES/CAVITIES (SC0109);
IRRITATION, EXTREME REACTION TO A CONDITION (SC0090).
CENTRAL NERVOUS SYSTEM, PERTAINING TO NEURAL BODY SYSTEM (SC0028);
EXCITATION, CENTRAL NERVOUS SYSTEM STIMULATION (SC0289).
CENTRAL NERVOUS SYSTEM, PERTAINING TO NEURAL BODY SYSTEM (SC0028);
DEPRESSION, DECREASE IN ACTIVITY/FUNCTION (SC0043). EUPHORIA, AN EXAGGERATED FEELING OF WELL-BEING (SC0061). NYSTAGMUS, RHYTHMICAL OSCILLATION OF EYEBALLS (SC0443). HEADACHE, PAIN IN HEAD OR CRANIUM A (SC0075). NAUSEA, SICKNESS AT THE STOMACH (SC0115). VOMITING, PERTAINING TO NAUSEA (SC0166). ANOREXIA, DIMINISHED APPETITE (SC0006) ABDOMINAL, SECTION BETWEEN THORAX AND PELVIS (SC0750);
PAIN, SUFFERING, EITHER PHYSICAL OR MENTAL (SC0182). DIZZINESS, FEELI FAINT, LIGHT-HEADED, UNSTEADY(SC0048). DROWSINESS, FALLING ASLEEP (SC0049). ATAXIA, MUSCULAR INCOORDINATION (SC0013). INCOORDINATION, LACK OF COORDINATION (SC0085). SALIVATION, EXCESS DISCHARGE OF SALIVA (SC0146). SPEECH DIFFICULTIES, TROUBLES WITH VERBAL EXPRESSION (SC061 BLURRED VISION, (SC0015). ERYTHEMA, REDNESS, SPOTS ON SKIN (SC0060). TINNITUS, RINGING IN EARS (SC0308). TREMORS, TREMBLING, SHAKING (SC0197). CONFUSION, IN A BEWILDERED STATE (SC0030). FACE/NECK FLUSH VASODILATION WITH HEAT OF FACE/NECK (SC0215). STUPOR, LETHARGY, UNCONSCIOUSNESS (SC0214). ANESTHESIA, LOSS OF SENSATION (SC0005). AMNESIA, LOSS OF MEMORY (SC0438). HYPOTHERMIA, LOWERED BODY TEMPERATU (SC0211).
LUNG, RESPIRATORY ORGAN (SC0377);
CONGESTION, ACCUMULATON OF BLOOD OR FLUID (SC0607). FATIGUE, TIREDNES SLUGGISH (SC0066). LASSITUDE, A SENSE OF WEARINESS (SC0098). IRRITABILITY, QUICK EXCITABILITY TO ANNOYANCE (SC0091). DYSPNEA, DIFFICULTY IN BREATHING (SC0052). FLATULENCE, EXCESSIVE GAS IN STOMACH/INTESTINES (SC0751). PARESTHESIA, ABNORMAL SENSATION WITHOUT CAUSE (SC0125). APPREHENSION, FEELING OF UNEASINESS, FEAR, ANXIETY (SC0073). VESICULATION, BLISTERING (SC0164). PHOTOPHOBIA, INTOLERANC TO LIGHT (SC0131).
TRANSIENT, PASSING QUICKLY (SC0731);
CORNEAL, TRANSPARENT MEMBRANE OVER EYE (SC0035).
DAMAGE, PERMANENT INJURY (SC0287).
MENSTRUAL DISORDERS, DISTURBANCE IN MENSES (SC0752). VENTRICULAR FIBRILLATION, RAPID CONTRACTIONS OF VENTRICLES (SC0162). INSOMNIA, INABILITY TO OBTAIN NORMAL SLEEP (SC0088). VERTIGO, FEELING OF WHIRLI MOTION (SC0163). THIRST, DESIRE FOR WATER (SC0210). ANEMIA, RED BLOO CELLS LESS THAN NORMAL (SC0004). UNCONSCIOUSNESS, NOT AWAKE; INSENSIBI (SC0198). COMA, STATE OF DEEP UNCONSCIOUSNESS (SC0583). LIVER DAMAGE, INJURY TO THE LIVER (SC0221). KIDNEY DAMAGE, INJURY TO THE KIDNEY (SC0220).
REPRODUCTIVE EFFECTS, BIRTH DEFECTS (SC0281);
IN EXPERIMENTAL ANIMALS, (SC0212).

FA

FIRST AID.

(1 OF 5)
IF THIS CHEMICAL GETS INTO THE EYES, WASH THE EYES IMMEDIATELY WITH LA AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWE LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

(2 OF 5)
IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SH

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

(3 OF 5)
IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

(4 OF 5)
BENZENE/TOLUENE/XYLENE INGESTION: REMOVE BY GASTRIC LAVAGE BEING CAREF TO AVOID ASPIRATION. GENERAL MEASURES - CONTROL EXCITEMENT OR CONVULSIONS WITH DIAZEPAM, 0.1 MG/KG SLOW INTRAVENOUSLY. KEEP AT COMPLETE BED REST UNTIL RESPIRATION IS NORMAL. DO NOT GIVE EPINEPHRINE OR EPHEDRINE OR RELATED DRUGS. THEY MAY INDUCE FATAL VENTRICULAR FIBRILLATION. MONITOR ECG TO DETECT VENTRICULAR ABNORMALITIES FORESHADOWING POSSIBLE CARDIAC ARREST. SPECIAL PROBLEMS - TREAT ANEMIA BY REPEATED BLOOD TRANSFUSIONS. TREAT RESPIRATORY OR PULMONARY PROBLE TREAT KIDNEY OR LIVER DAMAGE. GET MEDICAL ATTENTION IMMEDIATELY. TREATMENT MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

(5 OF 5)
GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMAC TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMOBILIZ A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUB FROM MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM THE MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY LIFTING CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF THE TEETH, DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL TUBE PASSES MARK. PLACE END OF TUBE IN GLASS OF WATER. IF TUBE IS OBSTRUCTED WH INTRODUCED ABOUT HALFWAY TO THE MARK, IT MAY HAVE ENTERED TRACHEA. AF TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO REMOVE STOMACH CONTENTS B IRRIGATION SYRINGE. SAVE STOMACH CONTENTS FOR EXAMINATION, AND REPEA INTRODUCTION AND WITHDRAWL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT BEGINN OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE 50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH. IF INTRODUCTION AND REMOVAL OF LA FLUID BY GRAVITY REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYRINGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE. AVOID GI LARGE QUANTITIES OF WATER. IF PATIENT COMATOSE, INTUBATE TRACHEA WIT CUFFED ENDOTRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATHETER PRI TO PASSAGE OF STOMACH TUBE. PROCEDURE MUST BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

1 - HSDB

NAME OF SUBSTANCE ZINC

CAS REGISTRY NUMBER 7440-66-6

HAZARDS SUMMARY NO DATA

DOT EMERGENCY GUIDELINES

Fire or Explosion: Flammable/combustible material; may be ignited by heat, sparks or flames. May burn rapidly with flare-burning effect. May ignite in presence of moisture. Violent reaction with water. /Zinc metal, powder or dust/ [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-76] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Health Hazards: Fire may produce irritating or poisonous gases. Contact may cause burns to skin and eyes. Runoff from fire control or dilution water may cause pollution. /Zinc metal, powder or dust/ [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-76] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Emergency Action: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Self-contained breathing apparatus (SCBA) and structural firefighter's protective clothing will provide limited protection. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available. /Zinc metal, powder or dust/ [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-76] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Fire: Some of these materials may react violently with water. Do not use water or foam. Do not get water inside container. Small Fires: Dry chemical, soda ash, lime or sand. Magnesium Fires: Use dry sand, Met-L-X powder or G-1 graphite powder. Move container from fire area if you can do it without risk. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. /Zinc metal, powder or dust/ [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-76] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

Spill or Leak: Do not touch spilled material. Shut off ignition sources; no flares, smoking or flames in hazard area. Small Dry Spills: With clean shovel place material into clean, dry container and cover; move containers from spill area. No water on spilled material; do not get water inside container. Spills: Dike for later disposal; do not apply water unless directed to do so. Magnesium Spills: Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry. Cleanup only under supervision of an expert. Move undamaged packages from spill area. /Zinc metal, powder or dust/ [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-76] **QC REVIEWED**

DOT EMERGENCY GUIDELINES

First Aid: Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. Wipe material from skin immediately; flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. /Zinc metal, powder or dust/ [Department of Transportation. Emergency Response Guidebook 1987. DOT P 5800.4. Washington, DC: U.S. Government Printing Office, 1987. G-76] **QC REVIEWED**

FIRE POTENTIAL

BULK DUST IN DAMP STATE MAY HEAT SPONTANEOUSLY & IGNITE ON EXPOSURE TO AIR. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

FIRE POTENTIAL

... IN COMPACT FORM DOES NOT BURN READILY UNTIL IT IS HEATED ABOVE 500 DEG C. [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 2340] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

HEALTH: 0. 0= Materials which on exposure under fire conditions would offer no health hazard beyond that of ordinary combustible material. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

FLAMMABILITY: 1. 1= Materials that must be preheated before ignition can occur. ... Water spray gently applied to surface will cause frothing which will extinguish the fire. Most combustible solids have a flammability rating of 1. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

NFPA HAZARD CLASSIFICATION

REACTIVITY: 1. 1= Materials which in themselves are normally stable but which may become unstable at elevated temperatures & pressures or which may react with water with some release of energy but not violently. Caution must be used in approaching the fire & applying water. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

FLAMMABLE LIMITS	NO DATA
FLASH POINT	NO DATA
AUTOIGNITION TEMPERATURE	NO DATA

FIRE FIGHTING PROCEDURES

Smother with suitable dry powder. /Zinc powder and dust/ [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

FIRE FIGHTING PROCEDURES

Personnel protection: In fire conditions wear self-contained breathing apparatus. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS

When zinc or one of its alloys is burned, melted, or heated to temperatures above 930 deg F, zinc metal oxide fume of particle diameter 1 u & below is formed. [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 2037] **PEER REVIEWED**

OTHER FIRE FIGHTING HAZARDS NO DATA

EXPLOSIVE LIMITS AND POTENTIAL

DUST FORMS EXPLOSIVE MIXTURES WITH AIR. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

EXPLOSIVE LIMITS AND POTENTIAL

A cloud of zinc dust generated by sieving the hot dried material exploded violently, apparently after initiation by a spark from the percussive sieve-shaking mechanism. ... The possibility of explosions of zinc dust suspended in air is presented as a serious hazard. ... A mixture with excess zinc filings explodes on heating. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1409] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

CONTACT WITH ACIDS & ALKALI HYDROXIDES (SODIUM HYDROXIDE, POTASSIUM HYDROXIDE, CALCIUM HYDROXIDE, ETC) RESULTS IN EVOLUTION OF HYDROGEN. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Ammonium nitrate & zinc are mixed intimately & wetted with 3 or 4 drops of water. After a short time, a violent reaction occurs with evolution of steam & zinc oxide. A violent reaction or flaming is likely in the reaction of chromic anhydride & zinc dust. When hydrazine mononitrate is heated in contact with zinc a flaming decomposition occurs at temperatures a little above its melting point. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-223] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Incompatible with ... barium oxide ... chlorates, chlorides ... hydrazine mononitrate, hydroxylamine ... magnesium chloride, chlorinated rubber, catalytic metals, halocarbons ... [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2751] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... Zinc dust ignites ... in contact with the liquid seleninyl bromide. [Bretherick, L. Handbook of Reactive Chemical Hazards.

3rd ed. Boston, MA: Butterworths, 1985., p. 105] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

When intryl fluoride is passed at ... /mild warming/ temp over ... /zinc/, glowing or white incandescence occurs. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1046] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Causes of spontaneous combustion and other hazards of silver-zinc batteries were investigated. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 3] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Ball milling aluminum zinc ... with inadequate inerting arrangements led to fires during operation or discharge of the mill. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 33] **QC REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Impact of an alloy containing 6% aluminum and 3% zinc with rusted steel caused incendive sparks which ignited LPG air mixtures ... . [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 34] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

The rapid autocatalytic dissolution of ... zinc in 9:1 methanol-carbon tetrachloride mixtures is sufficiently vigorous to be rated as potentially hazardous. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 171] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

The preparation of carbonylmetals by treating a transition metal halide ... with carbon monoxide and zinc ... a violent eruptive reaction occurs if a methanolic solution of a cobalt halide, a rhodium halide or a ruthenium halide is treated with both zinc and iron pentacarbonyl. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 492] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Addition of concn nitric acid to molten zinc (419 deg C) causes it to incandesce. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1120] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Oxidation of ... zinc /by potassium oxide/ proceeds with incandescence. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1254] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Reduction of ... titanium(IV) oxide by ... zinc is accompanied by more or less incandescence ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1358] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

The residues from zinc dust acetic acid reduction operations may ignites after a long delay if discarded into waste bins with paper. ... A mixture of zinc dust with ammonium nitrate,

or mixed nitrate and chloride ignites when moistened. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1409] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Carbon disulfide and zinc powder interact with incandescence. ... Warm zinc powder incandesces in fluorine, and zinc foil ignites in cold chlorine if traces of moisture are present. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1410] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Zinc residues from reduction of nitrobenzene to N-phenylhydroxylamine are often pyrophoric and must be kept wet during disposal. ... Arsenic, selenium and tellurium all react with incandescence on heating. Interaction on heating powdered zinc and sulfur is considered to be too violent ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1411] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Zinc residues from poorly mixed priming paint spontaneously inflamed after prolonged exposure to atmosphere. ... Accidental contamination of a metal scoop with flake sodium hydroxide, prior to its use with zinc dust, caused ignition of the latter. A stiff paste prepared from zinc dust and 10% sodium hydroxide solution attains a temp above 100 deg C exposure to air for 15 min. ... Flammability of some commercial zinc dusts or powders is attributed to presence of zinc chloride. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1412] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

/Hydrazinium nitrate is/ stable on slow heating to 300 deg C, it decomp explosively on rapid heating or under confinement. Presence of zinc ... cause flaming decomp above the melting point ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1206] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

The hydrated /zinc/ peroxide ... explodes at 212 deg C, and mixtures with aluminum or zinc powders burn brilliantly. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1359] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

MIXT OF POWDERED ZINC & OXIDIZING AGENT SUCH AS POTASSIUM CHLORATE CAN BE EXPLODED BY PERCUSSION. HYDROXYLAMINE IS REDUCED WHEN HEATED WITH ZINC DUST; SOMETIMES THE MIXTURE MERELY IGNITES; OTHER TIMES, IT EXPLODES. ZINC POWDER REACTS EXPLOSIVELY WHEN HEATED WITH MANGANESE CHLORIDE. POWDERED ZINC CAN DECOMPOSE PERFORMIC ACID VIOLENTLY, CAUSING AN EXPLOSION. POWDERED ZINC & POTASSIUM NITRATE EXPLODE IF HEATED. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 491M-223] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Alloys of zinc with iridium, platinum, or rhodium, after extraction with acid, leave residues which explode on warming in air, owing to the presence of occluded hydrogen (or oxygen) in the catalytic metal powders so produced. ... A paste of zinc

powder and carbon tetrachloride ... will readily burn after ignition by a high-temp primer. Intimate mixtures of chlorinated rubber with powdered zinc (or its oxide) in presence or absence of hydrocarbon or halocarbon solvents react violently or explosively at about 216 deg C. Powdered zinc initially reacts more violently with hexachloroethane in ethanol ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1410] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Zinc foil reacts explosively when heated with anhydrous manganese dichloride. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1411] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Violence of reaction depends on concn of /peroxyformic/ acid and scale and proportion of reactants. ... Zinc powder /with additions to 2-3 drops of ca 90% acid/ causes a violent explosion immediately. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 150] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

In the preparation of 2,2'-dimethyloxyazoxybenzene, solvent ethanol was distilled out of the mixture of 2-nitroanisole, zinc and sodium hydroxide before reaction was complete. The exothermic reaction continued unmoderated, and finally exploded. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 678] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Prolonged action of calcium chloride solution upon the zinc coating of a galvanized iron vessel caused slow evolution of hydrogen, which became ignited and exploded. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 873] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Mixtures of finely divided ... zinc with potassium chlorate (or other metal halogenates) are explosives and may be initiated by heat, impact or light friction. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 928] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

... Powdered /zinc/ reacted violently or explosively with fused ammonium nitrate below 200 deg C ... [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1197] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

A closed zinc container filled with a concn solution of ammonium sulfide exploded, owing to liberation of hydrogen sulfide and hydrogen, accompanying the formation of zinc ammounium sulfide. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1213] **PEER REVIEWED**

REACTIVITIES & INCOMPATIBILITIES

Lead azide, on prolonged contact with ... zinc ... forms traces of the extremely sensitive ... zinc azides which may initiate

detonation of the whole mass of azide. [Bretherick, L. Handbook of Reactive Chemical Hazards. 3rd ed. Boston, MA: Butterworths, 1985., p. 1312] **PEER REVIEWED**

DECOMPOSITION NO DATA

POLYMERIZATION NO DATA

OTHER HAZARDOUS REACTIONS NO DATA

ODOR THRESHOLD NO DATA

SKIN, EYE AND RESPIRATORY IRRITATIONS

A human skin irritant. [Sax, N.I. Dangerous Properties of Industrial Materials. 6th ed. New York, NY: Van Nostrand Reinhold, 1984., p. 2751] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING

Wear self-contained breathing apparatus. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Prevention ... /of metal fume fever/ is a matter of keeping exposure of workers below level of concn currently accepted as satisfactory for working with the metal in industry, preferably by employment of proper local exhaust ventilation to collect fumes at their source. Acceptable respirators are avail commercially but should be used only under suitable conditions. /Zinc/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 1340] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

Based on occupational study ... it has been estimated that metal fume fever will not occur at air concn below 15 mg/cu m. [Friberg, L., G.R. Nordberg, and V.B. Vouk. Handbook on the Toxicology of Metals. New York: Elsevier North Holland, 1979., p. 682] **PEER REVIEWED**

OTHER PREVENTIVE MEASURES

In all cases where zinc is heated to the point where fume is produced, it is most important to ensure that adequate ventilation is provided. Individual protection is best ensured by education of the worker concerning metal-fume fever & the provision of local exhaust ventilation, or, in some situations by wearing of supplied-air hood or mask. /Zinc compounds/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 2342] **PEER REVIEWED**

STABILITY/SHELF LIFE

STABLE IN DRY AIR; BECOMES COVERED WITH WHITE COATING OF BASIC CARBONATE ON EXPOSURE TO MOIST AIR [The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 1455] **PEER REVIEWED**

STABILITY/SHELF LIFE

Zinc is attacked by carbon dioxide & sulfur dioxide resulting chiefly in a coating of hydrated basic carbonate of variable composition; hydrogen peroxide may be formed in the process [Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 2037] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Whenever hazardous materials are to be transported, Title 49 CFR, Transportation, Parts 100-180, published by the US Dept of Transportation, contain the regulatory requirements and must be consulted. [52 FR 16482 (5/5/87)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Shipping description: Zinc powder or Zinc dust; IMO 4.3, UN 1436. Label(s) required: Dangerous when wet, spontaneously combustible. Packaging Instructions: 5.4.415 (passenger); 5.4.417 (cargo). /Zinc powder or Zinc dust/ [IATA. Dangerous Goods Regulations. 28th ed. Montreal, Canada: International Air Transport Association. Dangerous Goods Board, January 1, 1987., p. 223] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Water shipments: Shipping description: Zinc powder or Zinc dust; IMO 4.3, UN 1436. Label(s) required: Dangerous when wet, spontaneously combustible. /Zinc powder or Zinc dust/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization (1986)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Shipping description: Zinc powder or Zinc dust; IMO 4.3, UN 1436. Label(s) required: Dangerous when wet, spontaneously combustible. Acceptable Modes of transportation: Air, rail, road, and water. /Zinc powder or Zinc dust/ [52 FR 16668 (5/5/87)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Shipping description: Zinc ashes, IMO 4.3, UN 1435. Label(s) required: Dangerous when wet. Acceptable Modes of transportation: Air, rail, road, and water. /Zinc ashes/ [52 FR 16667 (5/5/87)] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Int'l Air Shipments: Shipping description: Zinc ashes, IMO 4.3, UN 1435. Label(s) required: Dangerous when wet. Packaging Instructions: 5.4.419 (passenger); 5.4.420 (cargo). /Zinc ashes/ [IATA. Dangerous Goods Regulations. 28th ed. Montreal, Canada: International Air Transport Association. Dangerous Goods Board, January 1, 1987., p. 222] **PEER REVIEWED**

SHIPMENT METHODS AND REGULATIONS

Water shipments: Shipping description: Zinc ashes, IMO 4.3, UN 1435. Label(s) required: Dangerous when wet. /Zinc ashes/ [IMDG; International Maritime Dangerous Goods Code; International Maritime Organization (1986)] **PEER REVIEWED**

STORAGE CONDITIONS

PROTECT AGAINST PHYS DAMAGE. STORE IN COOL, DRY, VENTILATED PLACE. SEPARATE FROM ACIDS, HALOGENATED HYDROCARBONS & STRONG ALKALI HYDROXIDES. PROTECT FROM MOISTURE. [National Fire Protection Association. Fire Protection Guide on Hazardous Materials. 9th ed. Boston, MA: National Fire Protection Association, 1986. 49-94] **PEER REVIEWED**

STORAGE CONDITIONS

Finely divided ... zinc compounds which present a fire & explosion hazard should be stored in a cool, dry, well ventilated place away from acute fire risks, open flames & powerful oxidizing agents. /Zinc compounds/ [International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office,

1983., p. 2342] **PEER REVIEWED**

CLEANUP METHODS NO DATA

DISPOSAL METHODS

SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices. [CITATION] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Zinc; Concentration Process: Activated carbon; Chemical Classification: Metals; Scale of Study: Full scale continuous flow; Type of Wastewater Used: (not stated); Results of Study: 81% reduction; 124 ppb effluent concentration; Carbon used as advanced treatment of biologically and chemically treated wastewater. Plant capacity 0.66 cu m/sec. Data presented for two time periods. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-166 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Zinc; Concentration Process: Activated carbon; Chemical Classification: Metals; Scale of Study: Full scale continuous flow; Type of Wastewater Used: (not stated); Results of Study: 61% reduction; 162 ppb effluent concentration; Carbon used as advanced treatment of biologically and chemically treated wastewater. Plant capacity 0.66 cu m/sec. Data presented for two time periods. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-166 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

Chemical Treatability of Zinc; Concentration Process: Miscellaneous sorbents; Chemical Classification: Metals; Scale of Study: Literature review; Type of Wastewater Used: Unknown; Results of Study: Final concentration reduced to 0.1 ppb; SiO_2 + CaO slags used. [USEPA; Management of Hazardous Waste Leachate, EPA Contract No. 68-03-2766 p.E-202 (1982)] **PEER REVIEWED**

DISPOSAL METHODS

The proprietary sulfex process (Permutit Co) has been applied to zinc wastes. The process involves addition of ferrous sulfide, which gradually releases sulfide to precipitate the zinc ... . [Patterson JW; Industrial Wastewater Treatment Technolgy 2nd Edition p.444 (1985)] **PEER REVIEWED**

DISPOSAL METHODS

In the case where zinc removal is the only consideration and recovery is not warranted, removal by precipitation can be accomplished by standard pH adjustment through lime addition, precipitation and flocculation, and sedimentation, employing standard waste treatment equipment. Operating data for existing chemical precipitation units indicate that levels of 1 mg/l or less of zinc are readily obtainable with lime precipitation, although assurance of consistent removal of precipitated zinc to lower levels from the effluent stream may require filtration. [Patterson JW; Industrial Wastewater Treatment Technolgy 2nd Edition p.447 (1985)] **PEER REVIEWED**

DISPOSAL METHODS

Reuse & landfill: Reclaim for salvage or reuse. Unsalvageable waste may be buried in an approved landfill. Max concn in effluent to sewer or stream is 1.0 ppm. [United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 301]
UNREVIEWED

RADIATION LIMITS AND POTENTIAL NO DATA

BELING CONSULTANTS

Beling Building, 1001 - 16th Street
Moline, Illinois 61265
(309) 757-9800
Fax: (309) 757-9812

Offices in Chicago, Joliet and Peoria, Illinois;
Davenport, Iowa; Beloit, Wisconsin; Hammond, Indiana; and Columbus, Ohio

PROVIDING PROFESSIONAL ENGINEERING AND ENVIRONMENTAL SERVICES FOR OVER 60 YEARS