APPENDIX C

HEALTH AND SAFETY CRITERIA FOR THE MIXED AND LOW-LEVEL WASTE TREATMENT FACILITY AT THE IDAHO NATIONAL ENGINEERING LABORATORY

PART 2, CHEMICAL CONSTITUENTS

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September 1992

MASTER

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APPENDIX C

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PART 2, CHEMICAL CONSTITUENTS

4. HEALTH AND SAFETY DATA FOR CHEMICAL CONSTITUENTS

This section contains health and safety information relating to the chemicals that have been identified in the mixed waste streams. Information is summarized in two summary sections--one for health considerations and one for safety considerations. Detailed health and safety information is presented in material safety data sheets (MSDSs) for each chemical.

4.1 Human Health Considerations Summary

Many chemicals in the candidate wastes are harmful to human health. Each of the chemicals has been analyzed for human health considerations including toxic or poisonous effects, irritation to skin or eyes, carcinogenicity, and evolution of toxic or irritating fumes. A summary of these results is presented in Table C-1.

Of the chemicals identified in the wastes, those that are toxic or poisonous through inhalation, ingestion, or skin contact include acetone, arsenic, barium, barium chloride, cadmium and the cadmium-containing compounds, chromium, chromium trioxide, copper, cresol, cyanide, hydrochloric acid, hydrofluoric acid, lead, mercury, methanol, methyl ethyl ketone, methylene chloride, nickel, nitric acid, nitrobenzene, selenium, Stoddard solvent, sulfuric acid, toluene, 1,1,1-trichloroethane, trichloroethylene, and xylene.¹

Some chemicals such as acetone, chromium trioxide, hydrochloric acid, mercury, methanol, methyl ethyl ketone, methylene chloride, nitrobenzene, sulfuric acid, toluene, 1,1,1-trichloroethylene, xylene, and zinc are skin or eye irritants. More than being irritants, a few chemicals are corrosive and can cause chemical burns to human skin; examples are cresol, sodium, sodium potassium alloy, and hydrochloric, hydrofluoric, and nitric acids. Many of the chemicals are known or suspect human carcinogens. Known carcinogens include arsenic and chromium trioxide. Suspect carcinogens are cadmium, cadmium chloride, chromium, lead, methylene chloride, nickel, and trichloroethylene.¹

Many chemicals emit toxic or irritating vapors or fumes either under ambient conditions, upon contact with other chemicals, or during heating. Chemicals that produce toxic fumes when heated to decomposition include arsenic, cadmium, and the cadmium-containing compounds, chlorine-containing compounds, cyanide, hydrochloric acid, lead, mercury, methylene chloride, nitrogen-containing compounds, selenium, sodium, sodium potassium, sulfur-containing compounds, 1,1,1-trichloroethane, trichloroethylene, and zinc. Others produce acrid smoke or irritating fumes when heated to decomposition. These include cresol, methanol, methyl ethyl ketone, Stoddard solvent, toluene, and xylene. Cyanide and sulfides can react with acid to emit toxic vapors and can also react with water or moisture to produce toxic vapors.¹

Table C-1. Health and safety concerns for candidate chemical constituents (adapted from Sax and Lewis, 1989).

Chemical	Health Concerns	Safety Concerns
Acetone	Moderately toxic by various routes including inhalation and ingestion; skin and severe eye irritant.	Dangerous fire and explosion hazard; can react vigorously with oxidizing materials; ignites on contact with chromium trioxide; incompatible with air, nitric acid, sulfuric acid.
Arsenic	Human poison; human carcinogen; experimental teratogen and tumorigen; emits highly toxic fumes when heated or on contact with acid or acid fumes.	Dust form is flammable when exposed to heat or flame or by chemical reaction with powerful oxidizers including chromium trioxide; dust is slightly explosive when exposed to flame; reacts vigorously on contact with oxidizing materials; incompatible with halogens, zinc, chromium trioxide.
Barium	Can cause poisoning through ingestion.	Dust is dangerous explosive when exposed to heat, flame, and chemical reactions; violent or explosive reaction with water or trichloroethylene; powder may ignite or explode in air or other oxidizing gas; incompatible with acids.
Barium chloride	Human poison through ingestion; emits toxic fumes of Cl^- when heated to decomposition.	Combustible solid; incompatible with acids, oxidizers.
Cadmium	Human poison through inhalation; experimental poison by ingestion, inhalation; experimental carcinogen, tumorigen, teratogen; emits toxic fumes of Cd when strongly heated.	Dust is flammable and explosive when exposed to heat, flame, or by chemical reaction with oxidizing agents, metals, zinc, and selenium; dust ignites spontaneously in air.

Chemical	Health Concerns	Safety Concerns
Cadmium chloride	Human poison through inhalation, ingestion, and skin contact; experimental carcinogen, tumorigen, teratogen; emits toxic fumes of Cl^- when heated to decomposition.	Reacts violently with potassium; chlorides are incompatible with acids or acid fumes.
Cadmium nitrate	Human poison through ingestion, inhalation; emits toxic fumes of Cd and NO_x when heated to decomposition.	Nitrates are powerful oxidizing agents which may cause violent reactions with reducing materials; fire and explosion hazards.
Cadmium sulfate	Human poison through ingestion; emits toxic fumes of Cd and SO_x when heated to decomposition.	Sulfates may cause violent reactions with aluminum.
Chromium	Human poison through ingestion; suspect carcinogen; experimental tumorigen.	Powder explodes spontaneously in air; ignites and is potentially explosive in atmospheres of carbon dioxide; incompatible with oxidants.
Chromium trioxide	Human poison through ingestion; skin irritant; human carcinogen by inhalation; experimental carcinogen and teratogen; corrosive; probably a severe eye, skin, and mucous membrane irritant.	Powerful oxidizer; ignites on contact with acetone, chromium (II) sulfide, alcohols such as methanol; reacts explosively with organic materials or solvents; reacts violently with selenium.
Copper	An experimental tumorigen and teratogen; human systemic effects by ingestion: nausea and vomiting.	Ignites on contact with chlorine; reacts violently with hydrogen sulfide in air, sulfuric acid.
Cresol	Moderately toxic through ingestion and skin contact; can cause severe chemical burns and dermatitis; emits toxic and irritating fumes when heated to decomposition.	Flammable when exposed to heat or flame; can react vigorously with oxidizing materials; vapor is slightly explosive when exposed to heat and flame; reacts violently with nitric acid.

Chemical	Health Concerns	Safety Concerns
Cyanide	Very poisonous through most routes; emits toxic (and flammable) vapors of CN^- when heated to decomposition or on contact with acid or water.	Flammable by chemical reaction with heat, moisture, or acid; violent reaction with nitrates and nitric acid; many cyanides rather easily evolve HCN, a flammable, toxic gas.
Hydrochloric acid	Human poison; mildly toxic through inhalation; moderately toxic experimentally by ingestion; corrosive irritant to the skin, eyes, and mucous membranes; experimental teratogen; emits toxic fumes of Cl^- when heated.	Reacts explosively with alcohols + hydrogen cyanide, sodium; reacts violently with sodium hydroxide, sulfuric acid, sodium.
Hydrofluoric acid	Human poison by inhalation; corrosive irritant to skin, eyes, and mucous membranes; experimental teratogenic effects; mutagenic data; inhalation of the vapors may cause ulcers of the upper respiratory tract; produces severe skin burns which are slow in healing; when heated to decomposition it emits highly corrosive fumes of F^- .	Reacts explosively with sodium (with aqueous acid); reacts violently with mercury (II) oxide + organic materials, nitric acid + lactic acid, sodium, sodium hydroxide, sulfuric acid; reacts with water or steam to produce toxic and corrosive fumes.
Lead	Human poison through ingestion; human systemic effects by ingestion and inhalation; suspect carcinogen; emits highly toxic fumes with heated to decomposition.	Flammable and moderately explosive in the form of dust when exposed to heat or flame; incompatible with zirconium, oxidants; can react vigorously with oxidizing materials.
Mercury	Human poison through inhalation; an experimental tumorigen and teratogen; corrosive to skin, eyes and mucous membranes; emits toxic fumes when heated to decomposition.	Reacts violently with metals; incompatible with oxidants; may explode on contact with lithium.

Chemical	Health Concerns	Safety Concerns
Methanol	Human poison through ingestion and skin contact; mildly toxic through inhalation; experimental teratogen, an eye and skin irritant; a narcotic; emits acrid smoke and irritating fumes when heated to decomposition.	Dangerous fire hazard when exposed to heat, flame, or oxidizers; vapor is explosive when exposed to heat and flame; reacts violently with nitric acid and oxidizing materials; incompatible with metals and oxidants.
Methyl ethyl ketone	Moderately toxic through ingestion and skin contact; human systemic effects by inhalation; experimental teratogen; a strong irritant; emits acrid smoke and fumes when heated to decomposition.	Dangerous fire hazard and moderate explosive hazard when exposed to heat or flame; reaction with hydrogen peroxide + nitric acid forms a heat and shock sensitive explosive product.
Methylene chloride	Moderately toxic through ingestion; mildly toxic through inhalation; experimental carcinogen and tumorigen; an eye and severe skin irritant; emits highly toxic fumes of phosgene and Cl ₂ when heated to decomposition.	Forms explosive mixtures with an atmosphere of high oxygen content, air + methanol vapor, potassium, sodium, and sodium potassium; vapor is explosive when exposed to heat and flame; reacts violently with sodium potassium alloy and lithium.
Nickel	Human poison through ingestion; experimental carcinogen, tumorigen, teratogen; hypersensitivity to nickel is common.	Powders may ignite spontaneously in air; reacts violently with selenium and sulfur; incompatible with oxidants.

Chemical	Health Concerns	Safety Concerns
Nitric acid	Human poison through unspecified route; experimental teratogen; corrosive to skin, eyes, mucous membranes and teeth; emits highly toxic fumes of NO _x and hydrogen nitrate when heated to decomposition.	Flammable by chemical reaction with reducing agents; forms explosive mixtures with metals, hydrocarbons, sulfur dioxide, dimethyl sulfide, metal cyanides, acetone + sulfuric acid, nitrobenzene + sulfuric acid, organic materials + oxidizers, alcohols, cotton + rubber + sulfuric acid + water; ignites on contact with acetone, metals, non-metal hydrides, wood; reacts with water or steam to produce heat and toxic and corrosive fumes; incompatible with antimony, bismuth, cyanides, cresol, hydrogen sulfide, metals, arsenic, selenium, and zinc.
Nitrobenzene	Human poison through unspecified route; moderately toxic through ingestion and skin contact; absorbed rapidly through the skin; an eye and skin irritant; emits toxic fumes of NO _x when heated to decomposition.	Oxidant; flammable and moderate explosion hazard when exposed to heat and flame; forms explosive mixtures with sulfuric acid, potassium, and oxidants such as nitric acid.
Selenium	Human poison through inhalation and possibly other routes; an experimental tumorigen and teratogen; produces toxic fumes when heated to decomposition.	Reacts violently with chromium trioxide, metals such as nickel, nitric acid, sodium, oxygen, potassium, zinc and uranium.
Silver	Experimental tumorigen; human systemic effects by inhalation: skin effects.	Dust is flammable when exposed to flame or by chemical reaction with sulfuric acid; incompatible with nitric acid.

Chemical	Health Concerns	Safety Concerns
Sodium	Emits toxic fumes of Na_2O when heated to decomposition; reacts exothermically with moisture of body or tissue surfaces causing thermal and chemical burns.	Very dangerous fire hazard when exposed to heat and moisture; explosion hazard when exposed to moisture; highly reactive in elemental form; reacts violently with water to form sodium hydroxide; reacts vigorously with oxidizing materials; reacts exothermically with halogens, acids, and halogenated hydrocarbons; under appropriate conditions, can react with moisture, air, carbon dioxide, chromium trioxide, hydrogen sulfide, hydrochloric acid, methylene chloride, nitric acid, selenium, sulfur, and sulfuric acid.
Sodium potassium	Corrosive to skin, eyes, and mucous membranes; emits toxic fumes of K_2O and Na_2O when heated.	Dangerous fire and explosion hazard; reacts violently with moisture to form caustics, hydrogen gas, and much heat; reacts violently with oxygen, water, halogens, oxidizers, and acids; under proper conditions, will react explosively with moisture, acids, halocarbons, metal halides, sulfides, and nitrobenzene.
Stoddard solvent	Moderately toxic to humans through unspecified route; mildly toxic by inhalation; emits acrid smoke and irritating fumes when heated to decomposition.	Highly dangerous fire hazard when exposed to heat, flame, spark, or oxidizing material; vapor is explosive when exposed to heat or flame.
Sulfides	Produce highly toxic fumes of SO_x when heated to decomposition; produces hydrogen sulfide, which is toxic and flammable, upon contact with moisture or acid.	Flammable when exposed to flame or by spontaneous chemical reaction; ignites violently on contact with many powerful oxidizers.

Chemical	Health Concerns	Safety Concerns
Sulfuric Acid	Human poison by unspecified route; experimental poison by inhalation; moderately toxic by ingestion; severe eye irritant; extremely irritating, corrosive, and toxic to tissue resulting in rapid destruction of tissue, causing severe burns; sensitivity to sulfuric acid or mists or vapors varies with individuals; emits highly toxic fumes when heated.	A very powerful, acidic oxidizer which can ignite or explode on contact with many materials, i.e. acetone + nitric acid, hydrogen gas, metals, sodium, steel, water, nitric acid + toluene; reacts with water or steam to produce heat; can react with oxidizing or reducing materials.
Toluene	Mildly toxic through inhalation; moderately toxic through other routes; experimental teratogen; eye irritant; experimental skin irritant; produces acrid smoke and irritating fumes when heated to decomposition.	Very dangerous fire hazard when exposed to heat, flame, or oxidizer; vapor is explosive when exposed to heat or flame; can react vigorously with oxidizing material; forms explosive mixtures with nitric acid or nitric acid + sulfuric acid.
1,1,1-Trichloroethane	Moderately toxic through inhalation, ingestion, and skin contact; experimental teratogen; human skin irritant; experimental eye irritant; narcotic in high concentrations; emits toxic fumes of Cl^- when heated to decomposition.	Under proper conditions can undergo hazardous reactions with potassium, sodium potassium alloy, sodium hydroxide, and oxygen.
Trichloroethylene	Mildly toxic through inhalation and ingestion; experimental carcinogen, tumorigen, and teratogen; an eye and severe skin irritant; inhalation of high concentrations causes narcosis and anesthesia; emits toxic fumes of Cl^- when heated to decomposition.	Very dangerous fire hazard when exposed to heat and flame; explosive in the form of vapor when exposed to heat or flame; can react violently with barium, lithium, sodium, and sodium hydroxide.

Chemical	Health Concerns	Safety Concerns
Xylene	Mildly toxic through inhalation and ingestion; experimental teratogen; a human eye irritant; skin and eye irritant; emits acrid smoke and irritating fumes when heated to decomposition.	Very dangerous fire hazard when exposed to heat or flame; can react with oxidizing material.
Zinc	Human skin irritant; emits toxic fumes of ZnO when heated to decomposition.	Dust form is flammable when exposed to heat and flame; may ignite spontaneously in air when dry; dust form is explosive when reacted with acids; incompatible with cadmium, chlorine, chromium trioxide, nitric acid, selenium, sulfur, water, sodium hydroxide, nitrobenzene and oxidants.

4.2 Safety Considerations Summary

Many chemicals in the waste streams are flammable under certain conditions or can ignite upon contact with other chemicals, and therefore are considered fire hazards. Flammable materials should be stored near proper fire protection equipment. In addition, chemicals should not be stored near those chemicals that can cause them to ignite.

Acetone, sodium, and sodium potassium are inherently flammable; while zinc may ignite spontaneously in dry air. Other chemicals are flammable when exposed to heat, flame, or oxidizing material. These include acetone, arsenic, cresol, cyanide, methanol, methyl ethyl ketone, methylene chloride, nitrobenzene, sodium, Stoddard solvent, sulfides, toluene, trichloroethylene, xylene, and metal dusts. Chemicals that ignite upon contact with other chemicals include cadmium dust and nitric acid with metals; chromium in atmospheres of carbon dioxide; chromium trioxide on contact with methanol or acetone; cyanide and sodium when exposed to heat and moisture; and sulfuric acid on contact with metals, sodium, and water.¹

Many chemicals identified in the candidate waste streams are explosive or may present explosive hazards under certain conditions. Acetone, chromium or nickel dust, and sodium potassium are inherently explosive. Chemicals that are explosive in the presence of heat or flame include methyl ethyl ketone and nitrobenzene; dust of arsenic, barium, cadmium, lead, nickel, silver, and zinc; and vapors of cresol, methanol, methylene chloride, Stoddard solvent, toluene and trichloroethylene.¹

Certain chemicals react explosively with other chemicals to produce a sudden release of pressure, gas, or heat. Barium and sodium potassium undergo explosive reactions with water. Chromium is potentially explosive in atmospheres of carbon dioxide. Chromium trioxide reacts explosively with organic materials and solvents. Acids, nitrobenzene, and some halogenated hydrocarbons react explosively with sodium or sodium potassium. Nitric acid forms explosive mixtures with metals and nitrobenzene and reacts explosively with hydrocarbons and sulfur dioxide. Hydrochloric acid reacts explosively with alcohols + sodium cyanide.¹

Some chemicals are safety hazards due to reactivity with other chemicals. Reactivity is defined as the tendency of a substance to undergo chemical reaction with the release of energy. Efforts should be made to store incompatible chemicals away from each other. Some chemicals react violently with water and therefore should not be stored in an area protected with a sprinkler system. The water-reactive chemicals identified in the candidate waste streams include barium, cyanide, sodium, sodium potassium, and zinc. Sodium is particularly dangerous in that it reacts exothermically with moisture of the body or tissue surfaces causing thermal and/or chemical burns.¹

Sodium is one of the most reactive substances present in the candidate wastes. It reacts violently with water to form sodium hydroxide, which reacts violently with hydrochloric acid, halogenated hydrocarbons, and zinc. Sodium also reacts with oxidizing materials, such as chromium trioxide; halogens; acids, including hydrochloric, nitric, and sulfuric acids; halogenated hydrocarbons, such as methylene chloride, 1,1,1-trichloroethane, and trichloroethylene; and under appropriate conditions air, moisture, carbon dioxide, hydrogen sulfide, selenium, and sulfur. Sodium potassium is also very reactive; it reacts violently with oxygen, water, halogens, oxidizers, and acids.¹

4.3 Material Safety Data Sheet Listing

Material Safety Data Sheets have been obtained for each constituent in the candidate mixed waste streams. The MSDSs were issued by the Chemical Regulatory Support unit at EG&G Idaho. The MSDSs contain information on substance identification, physical data, fire and explosion data, transportation data, toxicity, health effects and first aid, reactivity, storage and disposal, conditions to avoid, spill and leak procedures, and protective equipment. The MSDSs provide more detailed information than the waste stream health and safety EDFs and are included as a reference if the additional information is needed.

The MSDSs are arranged alphabetically according to the chemical name used in the EDFs. The order is shown below by the title of the MSDS. Some MSDS titles may be identified by synonyms to the chemical name used in the EDFs. If a different chemical name was used in the EDFs, it is given in parentheses. Some chemicals are included only because one or more of their radioactive isotopes have been identified in the waste streams. These chemicals are denoted by the word 'radionuclide' in parentheses immediately following the element name. The MSDSs are attached immediately following the MSDS listing in the order shown below.

Acetone
Aluminum
Antimony (radionuclide)
Americium-241 (radionuclide)
Arsenic
Barium
Barium Chloride
Bismuth
Cadmium
Cadmium Chloride
Cadmium Nitrate
Cadmium Sulfate
Cerium (radionuclide)

Cesium (radionuclide)
Chromium
Chromic Anhydride (Chromium Trioxide)
Cobalt (radionuclide)
Copper
m-Cresol (Cresol)
o-Cresol (Cresol)
p-Cresol (Cresol)
Europium (radionuclide)
Hydrochloric Acid
Hydrogen Fluoride (Hydrofluoric Acid)
Iodine (radionuclide)
Iron (radionuclide)
Lanthanum (radionuclide)
Lead
Lithium (radionuclide)
Manganese
Mercury
Methyl Alcohol (Methanol)
Methyl Ethyl Ketone
Dichloromethane (Methylene Chloride)
Nickel
Niobium (radionuclide)
Nitric Acid
Nitrobenzene
Plutonium-239 (radionuclide)
Potassium (radionuclide)
Ruthenium (radionuclide)
Selenium
Silver
Sodium
Sodium Potassium Alloy, M.P. 66 (Sodium Potassium)
Sodium Potassium Alloy, M.P. 12 (Sodium Potassium)
Stoddard Solvent
Strontium (radionuclide)
Sulfuric Acid
Tin
Toluene
Methyl Chloroform (1,1,1-Trichloroethane)
Trichloroethylene

Tritium (radionuclide)
Uranium (radionuclide)
Xylene
Yttrium (radionuclide)
Zinc
Zirconium (radionuclide)

4.4 References

1. Sax, N.I. and R.J. Lewis, Sr., 1989, *Dangerous Properties of Industrial Materials*, 7th ed., New York: Van Nostrand Reinhold.

ACETONE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS00140

CAS#: 67-64-1

FORMULA: C₃H₆O

UN: UN 1

ACETONE IS A CLEAR LIQUID WITH A SWEET ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: -4 F (-20 C). DANGEROUS FIRE HAZARD. VAPOR-AIR MIXTURES MAY BE EXPLOSIVE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

FOR SMALL FIRES: USE DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL-RESISTANT FOAM.

FOR LARGE FIRES: USE WATER SPRAY, FOG OR ALCOHOL-RESISTANT FOAM.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE EYES, NOSE, THROAT, AND SKIN. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, NAUSEA, VOMITING, UNCONSCIOUSNESS, AND LIVER AND KIDNEY DAMAGE. DRINKING ALCOHOL MAY WORSEN THE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SPILL OR LEAK:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

CERCLA REPORTABLE QUANTITY: 5000 POUND(S).

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS00140
67-64-1
ACETONE

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OHS00140

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: ACETONE

CAS NUMBER: 67-64-1
RTECS NUMBER: AL3150000

TRADE NAMES/SYNONYMS:

2-PROPANONE; DIMETHYLFORMALDEHYDE; DIMETHYL KETONE; BETA-KETOPROPANE;
METHYL KETONE; PROPANONENE; PYROACETIC ETHER; KTI ACETONE (KTI CHEMICALS);
GLYPTAL THINNER 1511F; SOLUTION "C" (MICROD INTERNATIONAL); RCRA U002;
STCC 4908105; UN 1090; C3H6O; OHS00140

CHEMICAL FAMILY:
KETONE, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-(O)-C-H3

MOLECULAR WEIGHT: 58.08

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ACETONE
CAS# 67-64-1

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ACETONE:

750 PPM (1780 MG/M3) OSHA TWA; 1000 PPM (2375 MG/M3) OSHA STEL
750 PPM (1780 MG/M3) ACGIH TWA; 1000 PPM (2375 MG/M3) ACGIH STEL
250 PPM (590 MG/M3) NIOSH RECOMMENDED 10 HOUR TWA
1000 PPM (2375 MG/M3) DFG MAK TWA;
2000 PPM (4750 MG/M3) DFG MAK 60 MINUTE PEAK, MOMENTARY VALUE, 3 TIMES/SHIFT

MEASUREMENT METHOD: CHARCOAL TUBE; CARBON DISULFIDE; GAS CHROMATOGRAPHY
WITH FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1300, KETONES I).

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS, VOLATILE LIQUID WITH A CHARACTERISTIC,
SWEETISH MINT-LIKE ODOR AND SWEETISH TASTE. BOILING POINT: 133 F (56 C)
MELTING POINT: -139 F (-95 C) SPECIFIC GRAVITY: 0.7899 VOLATILITY: 100%
VAPOR PRESSURE: 180 MMHG @ 20 C EVAPORATION RATE: (BUTYL ACETATE=1) 6
SOLUBILITY IN WATER: VERY SOLUBLE ODOR THRESHOLD: 20 PPM
VAPOR DENSITY: 2.0
SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, BENZENE, CHLOROFORM,
DIMETHYLFORMAMIDE AND MOST OILS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.
VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.
VAPOR-AIR MIXTURES ARE EXPLOSIVE.
FLASH POINT: -4 F (-20 C) (CC) UPPER EXPLOSIVE LIMIT: 13%
LOWER EXPLOSIVE LIMIT: 2.5% AUTOIGNITION TEMP.: 869 F (465 C)
FLAMMABILITY CLASS(OSHA): IB
FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL-RESISTANT FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).
FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL-RESISTANT FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).
ALCOHOL FOAM
(NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE
SOLIDS, 1991).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE
UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM
AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM
VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR
1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE

(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. USE FLOODING AMOUNTS OF WATER AS A FOG; SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS; KEEP UPWIND. IF FIRE IS UNCONTROLLABLE OR CONTAINERS ARE EXPOSED TO DIRECT FLAME, EVACUATE TO A RADIUS OF 1500 FEET. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991)

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.119
EXCEPTIONS: 49 CFR 173.118

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
ACETONE-UN 1090

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L

CARGO AIRCRAFT ONLY: 60 L

TOXICITY

ACETONE:

IRRITATION DATA: 395 MG OPEN SKIN-RABBIT MILD; 500 MG/24 HOURS SKIN-RABBIT MILD; 500 PPM EYE-HUMAN; 3950 UG EYE-RABBIT SEVERE; 20 MG/24 HOURS EYE-RABBIT MODERATE.

TOXICITY DATA: 500 PPM INHALATION-HUMAN TCLO; 440 UG/M3/6 MINUTES INHALATION-MAN TCLO; 10 MG/M3/6 HOURS INHALATION-MAN TCLO; 12000 PPM/4 HOURS INHALATION-MAN TCLO; 50100 MG/M3/8 HOURS INHALATION-RAT LC50; 110 GM/M3/1 HOUR INHALATION-MOUSE LCLO; 20 GM/KG SKIN-RABBIT LD50; 2857 MG/KG ORAL-MAN TDLO; 8 GM/KG ORAL-DOG LDLO; 5800 MG/KG ORAL-RAT LD50; 3000 MG/KG ORAL-MOUSE LD50; 5340 MG/KG ORAL-RABBIT LD50; 5 GM/KG SUBCUTANEOUS-DOG LDLO; 5000 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 5500 MG/KG INTRAVENOUS-RAT LD50; 4 GM/KG INTRAVENOUS-MOUSE LDLO; 1576 MG/KG INTRAVENOUS-RABBIT LDLO; 500 MG/KG INTRAPERITONEAL-RAT LDLO; 1297 MG/KG INTRAPERITONEAL-MOUSE LD50; 8 GM/KG INTRAPERITONEAL-DOG LDLO; 1159 MG/KG UNREPORTED-MAN LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION; SLIGHTLY TOXIC BY DERMAL ABSORPTION AND INGESTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH CHRONIC RESPIRATORY OR SKIN DISEASES.

ADDITIONAL DATA: ALCOHOL MAY ENHANCE THE TOXIC EFFECTS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

ACETONE:

IRRITANT/NARCOTIC. 20,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS AROUND 1000 PPM MAY CAUSE SLIGHT TRANSIENT IRRITATION OF THE UPPER RESPIRATORY TRACT. EXPOSURE TO 12,000 PPM HAS CAUSED THROAT IRRITATION AND CENTRAL NERVOUS SYSTEM DEPRESSION WITH WEAKNESS OF THE LEGS, HEADACHE, DIZZINESS, DROWSINESS, NAUSEA AND A GENERAL FEELING OF MALAISE. OTHER POSSIBLE EFFECTS FROM EXPOSURE TO HIGH CONCENTRATIONS INCLUDE DRYNESS OF THE MOUTH AND THROAT, INCOORDINATION OF MOTION AND SPEECH, RESTLESSNESS, ANOREXIA, ABDOMINAL PAIN, VOMITING, SOMETIMES FOLLOWED BY HEMATEMESIS, HYPOTHERMIA, DYSPNEA, SLOW, IRREGULAR RESPIRATION, SLOW, WEAK PULSE, PROGRESSIVE COLLAPSE WITH STUPOR, AND IN SEVERE CASES, COMA. LIVER DAMAGE MAY BE INDICATED BY HIGH UROBILIN LEVELS AND JAUNDICE. KIDNEY DAMAGE MAY BE INDICATED BY ALBUMIN AND RED AND WHITE BLOOD CELLS IN THE URINE. BLOOD GLUCOSE LEVELS MAY BE AFFECTED AND FATAL KETOSIS IS POSSIBLE.

CHRONIC EXPOSURE- WORKERS EXPOSED TO 500 PPM/6 HOURS/6 DAYS EXPERIENCED MUCOUS MEMBRANE IRRITATION, AN UNPLEASANT SMELL, HEAVY EYES, OVERNIGHT HEADACHE, AND GENERAL WEAKNESS ACCOMPANIED BY HEMATOLOGIC CHANGES. RECOVERY OCCURRED IN SEVERAL DAYS. WORKERS EXPOSED TO 1000 PPM FOR 3 HOURS/DAY FOR 7-15 YEARS REPORTED CHRONIC INFLAMMATION OF THE RESPIRATORY TRACT, STOMACH AND DUODENUM, DIZZINESS, LOSS OF STRENGTH, AND

ASTHENIA. DROWSINESS, VERTIGO, SENSATION OF HEAT, AND COUGHING HAVE ALSO BEEN REPORTED FROM CHRONIC EXPOSURE TO LOW CONCENTRATIONS. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ACETONE:

IRRITANT.

ACUTE EXPOSURE- CONTACT WITH THE LIQUID CAUSED MILD IRRITATION IN RABBITS. CELLULAR DAMAGE TO THE OUTER LAYERS OF THE EPITHELIUM WITH MILD EDEMA AND HYPEREMIA HAS BEEN DEMONSTRATED IN HUMANS, BUT WAS READILY REVERSIBLE. SMALL AMOUNTS MAY BE ABSORBED THROUGH INTACT SKIN.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS WITH DRYING, CRACKING, AND ERYTHEMA DUE TO THE DEFATTING ACTION ACCOMPANIED BY PERSISTENT PARESTHESIA OF THE FINGERS. THE AMOUNT ABSORBED THROUGH THE SKIN INCREASES DIRECTLY WITH THE FREQUENCY AND EXTENT OF THE EXPOSURE. 2 OR 3 GUINEA PIGS EXPOSED BY SKIN CONTACT FOR 3 WEEKS DEVELOPED CATARACTS BY THE END OF THREE MONTHS.

FIRST AID- 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.

EYE CONTACT:

ACETONE:

IRRITANT.

ACUTE EXPOSURE- IN HUMANS, VAPORS PRODUCE ONLY SLIGHT IRRITATION WHEN THE CONCENTRATION IS AT OR BELOW 1000 PPM. HOWEVER, HIGH VAPOR CONCENTRATIONS HAVE CAUSED CORNEAL EPITHELIAL AND CONJUNCTIVAL INJURY IN ANIMALS. LIQUID SPLASHED IN HUMAN EYES CAUSES AN IMMEDIATE STINGING SENSATION AND, IF WASHED PROMPTLY, DAMAGE ONLY TO THE CORNEAL EPITHELIUM CHARACTERIZED BY MICROSCOPIC GRAY DOTS AND A FOREIGN BODY SENSATION, WHICH HEALS COMPLETELY IN 1-2 DAYS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO THE VAPORS MAY CAUSE IRRITATION OR CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

ACETONE:

NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE A FRUITY ODOR OF THE BREATH AND MUCOUS MEMBRANE AND GASTROENTERIC IRRITATION. IN ACUTE CASES, A LATENT PERIOD MAY BE FOLLOWED BY RESTLESSNESS, DIARRHEA, NAUSEA AND VOMITING PROCEEDING TO HEMATEMESIS AND PROGRESSIVE COLLAPSE WITH STUPOR. HEPATORENAL LESIONS HAVE BEEN REPORTED. THE BLOOD GLUCOSE LEVEL MAY BE AFFECTED AND KETOSIS MAY BE FATAL. 10-20 MILLILITERS HAVE BEEN TOLERATED WITHOUT ILL EFFECTS. LARGE

AMOUNTS HAVE PRODUCED LETHARGY, PHARYNGEAL AND SOFT PALATE EROSIONS AND ERYTHEMA. 200 MILLILITERS HAVE CAUSED STUPOR WITHIN A HALF HOUR, FLUSHED CHEEKS, SHALLOW RESPIRATION, AND COMA WHICH LASTED FOR 12 HOURS. RENAL GLUCOSURIA PERSISTED FOR 5 MONTHS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC FOLLOWED BY WATER. (IF VOMITING OCCURS KEEP THE HEAD BELOW THE HIPS TO PREVENT ASPIRATION). REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. GIVE ACTIVATED CHARCOAL. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

ACETONE:

ACIDS: INCOMPATIBLE.

AMINES (ALIPHATIC): INCOMPATIBLE.

BROMINE: VIOLENT REACTION WITH EXCESS AMOUNTS OF BROMINE.

BROMINE TRIFLUORIDE: EXPLOSION ON CONTACT.

BROMOFORM: VIOLENT REACTION IN PRESENCE OF BASES (E.G. POTASSIUM HYDROXIDE).

CHLOROFORM: VIOLENT REACTION IN PRESENCE OF A BASE.

CHROMIUM TRIOXIDE: IGNITION ON CONTACT AT AMBIENT TEMPERATURE.

CHROMYL CHLORIDE: INCANDESCENT REACTION.

DIOXYGEN DIFLUORIDE + SOLID CARBON DIOXIDE: EXPLOSION AT -78 C.

HEXACHLOROMELAMINE: POSSIBLE EXPLOSION.

HYDROGEN PEROXIDE: EXPLOSION.

NITRIC ACID: IGNITION.

NITRIC + ACETIC ACID MIXTURE: POSSIBLE EXPLOSION.

NITRIC + SULFURIC ACID MIXTURE: VIOLENT OXIDATION.

NITROSYL CHLORIDE: EXPLOSIVE REACTION.

NITROSYL PERCHLORATE: IGNITION AND EXPLOSION.

NITRYL PERCHLORATE: IGNITION AND EXPLOSION.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

PERMONOSULFURIC ACID: EXPLOSION.

PLASTICS: INCOMPATIBLE.

PLATINUM + NITROSYL CHLORIDE: POSSIBLE EXPLOSION.

POTASSIUM-TERT-BUTOXIDE: IGNITION.

RAYON: INCOMPATIBLE.

SODIUM HYPOBROMITE: EXPLOSION.

SODIUM HYPOIODITE: POSSIBLE EXPLOSION.

SULFUR DICHLORIDE: VIOLENT REACTION.

SULFURIC ACID AND POTASSIUM BICHROMATE: IGNITION.

THIODIGLYCOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.

THIOTRIAZYL PERCHLORATE: POSSIBLE EXPLOSION.
1,1,1-TRICHLOROETHANE: EXOTHERMIC CONDENSATION BY A BASIC CATALYST.
TRICHLOROMELAMINE: POSSIBLE EXPLOSION.
SEE ALSO KETONES.

KETONES:

ACETALDEHYDE: VIOLENT CONDENSATION REACTION.
NITRIC ACID + HYDROGEN PEROXIDE: FORMATION OF EXPLOSIVE PRODUCT.
PERCHLORIC ACID: VIOLENT DECOMPOSITION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U002.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE AND POISONOUS; DO NOT ALLOW UNNECESSARY PERSONNEL IN AREA. DO NOT OVERHEAT CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE AND TRAVEL A CONSIDERABLE DISTANCE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ACETONE:

1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY POWERED, AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

6250 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW MODE.

12,500 PPM- ANY AIR-PURIFYING FULL-FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

20,000 PPM- ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ESCAPE- 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.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 09/06/84 REVISION DATE: 02/25/92

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ALUMINUM OTHER THAN POWDER MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS01005

CAS#: 7429-90-5 FORMULA: AL

ALUMINUM IS A SILVERY-WHITE METAL WITH A BLUISH TINT.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: SLIVERS MAY CAUSE IRRITATION OF THE SKIN AND EYES. ADDITIONAL EFFECTS MAY INCLUDE NAUSEA, VOMITING, AND STOMACH PAIN.

LONG TERM EXPOSURE: NO INFORMATION AVAILABLE ON SIGNIFICANT ADVERSE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS01005

7429-90-5

ALUMINUM OTHER THAN POWDER

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OHS01005

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7429-90-5
RTECS NUMBER: BD0330000

SUBSTANCE: ALUMINUM OTHER THAN POWDER

TRADE NAMES/SYNONYMS:

NORAL ALUMINUM; NORAL EXTRA FINE LINING GRADE; NORAL NON-LEAFING GRADE;
ALUMINA FIBRE; ALUMINUM BRONZE; METANA; ALUMINUM; NORAL INK GRADE ALUMINUM;
A-552; A-557; A-547; I-213; I-213-10; ALUMINUM METAL; OHS01005

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: AL

MOLECULAR WEIGHT: 26.98

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ALUMINUM
CAS# 7429-90-5

PERCENT: 100.0

OTHER CONTAMINANTS: NONE.

EXPOSURE LIMITS:

ALUMINUM:

10 MG/M3 ACGIH TWA

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: SILVERY-WHITE, DUCTILE METAL WITH A SOMEWHAT BLuish TINT

BOILING POINT: 4442 F (2450 C) MELTING POINT: 1220 F (660 C)

SPECIFIC GRAVITY: 2.7 VAPOR PRESSURE: 1 MM @ 1284 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN HYDROCHLORIC ACID, HOT, CONCENTRATED
SULFURIC ACID, PERCHLORIC ACID, STRONG ALKALIES; INSOLUBLE IN CONCENTRATED
NITRIC ACID, HOT ACETIC ACID

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE
FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

THE MOIST, FINELY DIVIDED METAL MAY IGNITE IN AIR.

FIREFIGHTING MEDIA:
USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE
METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA
FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE
UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM
AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5,
GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING
MATERIAL.

TOXICITY

ALUMINUM:
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ALUMINUM:
ACUTE EXPOSURE- THE ONLY REPORTED INHALATION EFFECTS ARE FOR THE DUST,
POWDER OR FUME FORMS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING
HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST.
TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ALUMINUM:

ACUTE EXPOSURE- A SLIVER OF ALUMINUM PENETRATING THE SKIN MAY FORM ALUMINUM SALTS WHICH INDUCE LOCAL IRRITATION AND POSSIBLY SECONDARY INFECTIONS. CONTACT WITH ROUGH OR SHARP EDGES MAY CAUSE CUTS OR ABRASIONS. CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

ALUMINUM:

ACUTE EXPOSURE- SMALL METAL PARTICLES HAVE BEEN OBSERVED IN THE EYES OF HUMANS ON OR NEAR THE RETINA AND ARE USUALLY NONIRRITATING AND WELL TOLERATED. THE PARTICLES GRADUALLY CHANGE INTO A WHITE POWDER AND DISAPPEAR IN 2 OR 3 YEARS LEAVING ONLY A CHARACTERISTIC LOCAL NECROTIC "IMPRINT". LARGER PARTICLES AND SPLINTERS MAY SCRATCH OR CUT THE CORNEA AND LIDS.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

ALUMINUM:

ACUTE EXPOSURE- THE ACTUAL EFFECTS MAY BE DETERMINED BY THE FORM OF THE ALUMINUM THAT IS INGESTED. GENERALLY IT HAS A VERY LOW ACUTE SYSTEMIC TOXICITY DUE TO ITS POOR ABSORPTION FROM THE GASTROINTESTINAL TRACT. MASSIVE DOSES MAY CAUSE GASTROINTESTINAL IRRITATION AND MAY BE TOXIC.

CHRONIC EXPOSURE- LARGE AMOUNTS MAY INTERFERE WITH INTESTINAL ABSORPTION OF PHOSPHATES LEADING TO RICKETTS. CERTAIN DISEASE STATES INFLUENCE THE CONCENTRATION OF ALUMINUM IN ORGANS, FOR EXAMPLE, ALZHEIMER'S DISEASE IN WHICH EXCESSIVE LEVELS HAVE BEEN FOUND IN THE BRAIN.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

ALUMINUM OTHER THAN POWDER:

ARSENIC TRIOXIDE, SODIUM ARSENATE AND SODIUM HYDROXIDE: THE ALKALINE ATTACK

ON THE METAL PRODUCED FLAMMABLE HYDROGEN WHICH IN TURN GENERATED TOXIC TOXIC ARSINE GAS.

BARIUM SULFATE: VIOLENT EXPLOSION.

BROMATES (BARIUM, CALCIUM, MAGNESIUM, POTASSIUM, SODIUM OR ZINC): WHEN BOTH ARE FINELY DIVIDED THE MIXTURE CAN BE EXPLODED BY HEAT, PERCUSSION, AND, SOMETIMES, LIGHT FRICTION.

BROMINE: THE FOIL REACTS WITH THE LIQUID AT 15 C AND INCANDESCENCE OCCURS ON WARMING IN THE VAPOR.

BUTANOL: SEVERLY ATTACKED THE METAL IN AN AUTOCLAVE AT AROUND 100 C LIBERATING FLAMMABLE HYDROGEN AND CAUSING A SHARP RISE IN PRESSURE. OTHER ALCOHOLS WOULD BEHAVE SIMILARLY.

CALCIUM SULFATE: VIOLENT EXPLOSION.

CHLORATES (BARIUM, CALCIUM, MAGNESIUM, POTASSIUM, SODIUM OR ZINC): WHEN BOTH ARE FINELY DIVIDED, THE MIXTURE CAN BE EXPLODED BY HEAT, PERCUSSION, AND, SOMETIMES, LIGHT FRICTION.

CHLORINE FLUORIDE: POSSIBLE IGNITION.

CHLORINE TRIFLUORIDE AND CARBON: VIOLENT REACTION.

CHLOROFLUOROHYDROCARBONS: CONTACT WITH FRESH METAL SURFACES MAY RESULT IN INTENSE EXOTHERMIC REACTIONS.

CHLOROMETHANE, LIQUIFIED: POSSIBLE IGNITION DUE TO FORMATION OF AN ALKYLALUMINUM COMPOUND.

COPPER AND SULFATE: POSSIBLE EXPLOSION IN A SILICA VACUUM TUBE @ 900-1000 C.

COPPER OXIDE: STRONG EXPLOSION ON HEATING.

DIBORANE: INTERACTION GIVES COMPLEX HYDRIDES WHICH MAY IGNITE IN AIR.

1,2-DIFLUOROTETRAFLUOROETHANE: CONTACT WITH FRESH METAL SURFACES MAY RESULT IN INTENSE EXOTHERMIC REACTIONS.

ETHYLENE DICHLORIDE, PROPYLENE DICHLORIDE AND ORTHODICHLOROBENZENE: EXPLOSIVE REACTION.

FLUOROCHLORO LUBRICANTS: EXPLOSIVE REACTION WITH FRESH ALUMINUM SURFACES UNDER PRESSURE.

HYDROCHLORIC ACID: THE METAL IS ATTACKED VIOLENTLY BY THE AQUEOUS ACID.

HYDROGEN CHLORIDE: VIGOROUS EXOTHERMIC REACTION.

IODATES (BARIUM, CALCIUM, MAGNESIUM, POTASSIUM, SODIUM, OR ZINC: WHEN BOTH ARE FINELY DIVIDED, THE MIXTURE CAN BE EXPLODED BY HEAT, PERCUSSION, AND, SOMETIMES, LIGHT FRICTION.

IODINE: VIOLENT REACTION IN THE PRESENCE OF WATER AS LIQUID, VAPOR OR THAT PRESENT IN HYDRATED SALTS.

IODINE MONOCHLORIDE: THE METAL FOIL IGNITES SPONTANEOUSLY AND BURNS WITH A BLUISH-WHITE FLAME AFTER CONTINUED CONTACT.

IODINE HEPTAFLUORIDE: INTERACTION ON HEATING WITH EVOLUTION OF HEAT AND LIGHT.

IODINE PENTAFLUORIDE: IGNITION ON PROLONGED CONTACT.

IRON OXIDE: IMPACT BETWEEN AN ALUMINUM OBJECT AND A RUSTY SURFACE MAY CAUSE SPARKS, POSSIBLY INITIATING AN EXOTHERMIC REACTION.

LEAD OXIDE: VIOLENT REACTION.

MERCURY(II) SALTS: IN CONTACT WITH THE FOIL, IN THE PRESENCE OF MOISTURE, A VIGOROUS AMALGAMATION REACTION ENSUES.

METHANOL AND CARBON TETRACHLORIDE (9:1): RAPID AUTOCATALYTIC DISSOLUTION OF THE METAL.

METHYL BROMIDE: POSSIBLE IGNITION AND EXPLOSION.

MONOBROMOTRIFLUOROMETHANE: CONTACT WITH FRESH METAL SURFACES MAY RESULT IN INTENSE EXOTHERMIC REACTIONS.

PALLADIUM: IF AN ALUMINUM SHEATH SURROUNDING A PALLADIUM CORE ABOUT .0025 INCH DIAMETER IS HEATED TO THE MELTING POINT OF ALUMINUM, 600 C, AN

ALLOYING REACTION TAKES PLACE WITH PRODUCTION OF A BRILLANT FLASH AND A TEMPERATURE OF 2,800 C.
PLATINUM: THIN LAYERS ON ALUMINUM FOIL OR WIRE ARE USED AS IGNITERS DUE TO THE INTENSE HEAT OF ALLOY FORMATION WHICH IS SUFFICIENT TO MELT THE INTERMETALLIC COMPOUNDS.
POLYTRIFLUOROETHYLENE GREASES OR OILS: EXPLOSIVE REACTION WITH FRESH ALUMINUM SURFACES UNDER PRESSURE.
POTASSIUM HYDROXIDE: VIGOROUS REACTION WITH EVOLUTION OF FLAMMABLE HYDROGEN.
POTASSIUM SULFATE: VIOLENT EXPLOSION ON MELTING.
PROPYLENE DICHLORIDE: RAPID DECOMPOSITION MAY OCCUR.
SILICON AND LEAD OXIDE: EXPLOSION ON HEATING.
SODIUM CARBONATE: EXPLOSION WHEN APPLIED TO THE RED-HOT METAL.
SODIUM HYDROXIDE: VIGOROUS REACTION WITH EVOLUTION OF FLAMMABLE HYDROGEN.
SODIUM PEROXIDE: IGNITION UNDER HIGH FRICTION AT 240 C WHEN THE METAL IS FINELY DIVIDED.
SODIUM SULFATE: VIOLENT EXPLOSION ON MELTING.
SULFURIC ACID, HOT, CONCENTRATED: ATTACKS THE METAL WITH EVOLUTION OF FLAMMABLE HYDROGEN.
TETRACHLOROETHYLENE: VIOLENT REACTION.
TETRAFLUOROMETHANE: CONTACT WITH FRESH METAL SURFACES MAY RESULT IN INTENSE EXOTHERMIC REACTIONS.
1,1,1-TRICHLORETHANE: VIOLENT DECOMPOSITION WITH EVOLUTION OF HYDROGEN

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

***STORAGE**

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

NO REPORTS FOUND.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

NO SPECIAL PRECAUTIONS INDICATED.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION AND/OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

PROTECTIVE CLOTHING NOT REQUIRED. AVOID REPEATED OR PROLONGED CONTACT WITH THIS SUBSTANCE.

GLOVES:

PROTECTIVE GLOVES ARE NOT REQUIRED BUT RECOMMENDED.

EYE PROTECTION:

EYE PROTECTION NOT REQUIRED, BUT ADVISABLE.

CREATION DATE: 02/06/85

REVISION DATE: 12/20/91

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ANTIMONY MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS01610

CAS#: 7440-36-0 FORMULA: SB

ANTIMONY IS A SILVERY-WHITE LUSTROUS METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

MODERATE FIRE HAZARD. DUST-AIR MIXTURES MAY CATCH FIRE OR EXPLODE. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: THE DUST FORM OF ANTIMONY MAY CAUSE IRRITATION TO THE NOSE, THROAT, EYES, STOMACH, AND SKIN WITH ITCHING. ADDITIONAL EFFECTS MAY INCLUDE DIFFICULTY BREATHING, CHILLS, FEVER, NAUSEA, VOMITING, SEVERE DIARRHEA, LOW BLOOD PRESSURE, AND LUNG CONGESTION. MAY ALSO CAUSE HEART, LIVER AND KIDNEY DAMAGE, UNCONSCIOUSNESS, AND POSSIBLE DEATH.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, DRY THROAT, METALLIC TASTE, TIGHTNESS IN THE CHEST, SLEEPLESSNESS, MUSCULAR PAIN, WEAKNESS, AND DIZZINESS MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS AND TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS01610

7440-36-0

ANTIMONY

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OHS01610

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-36-0
RTECS NUMBER: CC4025000

SUBSTANCE: ANTIMONY

TRADE NAMES/SYNONYMS:

ANTIMONY BLACK; ANTIMONY REGULUS; STIBIUM; ANTIMONY POWDER;
ANTIMONY ELEMENT; C.I. 77050; UN 2871; A-845; A-846; OHS01610

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: SB

MOLECULAR WEIGHT: 121.75

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=2 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=2 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ANTIMONY
CAS# 7440-36-0

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ANTIMONY:

0.5 MG/M3 OSHA TWA
0.5 MG/M3 ACGIH TWA
0.5 MG/M3 NIOSH RECOMMENDED 10 HOUR TWA

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: SILVERY-WHITE LUSTROUS METAL. BOILING POINT: 3182 F (1750 C)

MELTING POINT: 1202 F (630 C) SPECIFIC GRAVITY: 6.684

VAPOR PRESSURE: 1 MMHG @ 1627 F SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN AMMONIUM SULFIDE, HOT SULFURIC ACID

HARDNESS: 3-3.5 MOHS

AUTOIGNITION TEMPERATURE: 788 F (420 C) (CLOUD); 626 F (330 C) (DUST LAYER)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

LOWER EXPLOSIVE LIMIT: 0.42 OZ/FT3

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY
RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 53).

EXTINGUISH USING AGENT SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING
VAPORS AND DUSTS. KEEP UPWIND.

TRANSPORTATION DATA

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
ANTIMONY POWDER-UN 2871

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
KEEP AWAY FROM FOOD

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
 EXCEPTIONS: 49 CFR 173.153
 NON-BULK PACKAGING: 49 CFR 173.213
 BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
 PASSENGER AIRCRAFT OR RAILCAR: 100 KG
 CARGO AIRCRAFT ONLY: 200 KG

TOXICITY

ANTIMONY:
 TOXICITY: 7 GM/KG ORAL-RAT LD50; 100 MG/KG INTRAPERITONEAL-RAT LD50;
 150 MG/KG INTRAPERITONEAL-GUINEA PIG LD50; 90 MG/KG INTRAPERITONEAL-MOUSE
 LD50; TUMORIGENIC DATA (RTECS).
 CARCINOGEN STATUS: NONE.
 ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INGESTION.
 LOCAL EFFECTS: IRRITANT-SKIN, EYE, INHALATION.
 TARGET EFFECTS: POISONING MAY AFFECT THE RESPIRATORY AND CARDIVASCULAR SYSTEM,
 LIVER, AND KIDNEYS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
 ANTIMONY:
 IRRITANT. 80 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
 ACUTE EXPOSURE- INHALATION OF ANTIMONY OR ITS COMPOUNDS MAY CAUSE IRRITATION
 OF THE RESPIRATORY AND GASTROINTESTINAL TRACTS, SORE THROAT, SHALLOW
 RESPIRATION, DIZZINESS, WEIGHT LOSS, GINGIVITIS, ANEMIA, EOSINOPHILIA,
 AND INHIBITION OF SOME ENZYME SYSTEMS, SUCH AS PROTEIN OR CARBOHYDRATE
 METABOLISM. PULMONARY CONGESTION, EDEMA AND DEATH DUE TO RESPIRATORY OR
 CIRCULATORY FAILURE MAY OCCUR. PATHOLOGIC FINDINGS INCLUDE ACUTE
 CONGESTION OF THE HEART, LIVER, AND KIDNEYS. METAL FUME FEVER, AN
 INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED
 FUMES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS.
 SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST
 AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY
 INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A
 DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE, AND A GENERALIZED FEELING OF
 MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA,
 OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING,
 EXCESSIVE URINATION, DIARRHEA, AND PROSTRATION MAY ALSO OCCUR. TOLERANCE
 TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY
 SUBSIDE WITHIN 24-36 HOURS.
 CHRONIC EXPOSURE- REPEATED OR PROLONGED INHALATION OF ANTIMONY OR ITS
 COMPOUNDS MAY CAUSE STOMATITIS, DRY THROAT, METALLIC TASTE, GINGIVITIS,
 SEPTAL AND LARYNGEAL PERFORATION, LARYNGITIS, HEADACHE, DYSPNEA,
 INDIGESTION, NAUSEA, VOMITING, DIARRHEA, ANOREXIA, ANEMIA, WEIGHT LOSS,
 PAIN OR TIGHTNESS IN THE CHEST, SLEEPLESSNESS, MUSCULAR PAIN AND WEAKNESS,
 DIZZINESS, PHARYNGITIS, BRONCHITIS, AND PNEUMONITIS. DEGENERATIVE CHANGES
 OF THE LIVER AND KIDNEYS MAY OCCUR LATER. BENIGN PNEUMOCONIOSIS AND
 OBSTRUCTIVE LUNG DISEASES HAS BEEN REPORTED IN WORKERS. WOMEN MAY BE

MORE SUSCEPTIBLE TO THE SYSTEMIC EFFECTS OF EXPOSURE. ANTIMONY CROSSES THE PLACENTA, IS PRESENT IN AMNIONIC FLUID, AND IS EXCRETED IN HUMAN MILK. A STUDY REPORTED AN INCREASED INCIDENCE OF SPONTANEOUS LATE ABORTIONS, PREMATURE BIRTHS, AND GYNECOLOGICAL PROBLEMS AMONG FEMALE ANTIMONY SMELTER WORKERS. AN EXCESS OF DEATHS FROM LUNG CANCER HAS BEEN REPORTED IN SMELTER WORKERS WITH MORE THAN 7 YEARS EXPOSURE TO RELATIVELY HIGH LEVELS OF ANTIMONY DUST AND FUMES. ANIMAL STUDIES INDICATE THAT ANTIMONY DUST CAUSES PATHOLOGICAL CHANGES IN CARDIAC MUSCLE AND MAY INDUCE INTERSTITIAL PNEUMONITIS AND ENDOGENOUS LIPOID PNEUMONIA. AS EVALUATED BY RTECS, ADMINISTRATION TO RATS BY INHALATION RESULTED IN A STATISTICALLY SIGNIFICANT INCREASE IN THE INCIDENCE OF CARCINOGENIC TUMORS OF THE LUNGS AND THORAX.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ANTIMONY:

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT WITH DUSTS FROM ANTIMONY OR ITS COMPOUNDS MAY CAUSE IRRITATION WITH ITCHING.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH ANTIMONY OR ITS COMPOUNDS MAY CAUSE ITCHING SKIN, PAPULES AND PUSTULES AROUND SWEAT AND SEBACEOUS GLANDS, BUT RARELY AROUND THE FACE, AND DERMATITIS. PROLONGED EXPOSURE BY ANTIMONY SMELTER WORKERS RESULTED IN SKIN RASHES ON FOREARMS AND THIGHS RESEMBLING CHICKEN POX PUSTULES.

FIRST AID- 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.

EYE CONTACT:

ANTIMONY:

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT WITH DUST OR FUMES MAY CAUSE IRRITATION AND INFLAMMATION OF THE CORNEA.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

ANTIMONY:

ACUTE EXPOSURE- INGESTION OF ANTIMONY OR ITS COMPOUNDS MAY CAUSE VIOLENT IRRITATION OF THE NOSE, THROAT, STOMACH, AND INTESTINES, NAUSEA, VOMITING, SEVERE DIARRHEA WITH MUCOUS AND LATER WITH BLOOD, SLOW AND SHALLOW RESPIRATION, AND LOW BLOOD PRESSURE. HEMORRHAGIC NEPHRITIS AND HEPATITIS MAY OCCUR CONCOMITANTLY OR FOLLOW LATER. PULMONARY CONGESTION AND EDEMA, COMA, AND DEATH FROM CIRCULATORY OR RESPIRATORY FAILURE MAY OCCUR.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION OF ANTIMONY OR ITS

COMPOUNDS MAY CAUSE SORES IN THE MOUTH AND THROAT, DRY THROAT, GINGIVITIS, LARYNGITIS, HEADACHE, INDIGESTION, NAUSEA, VOMITING, DIARRHEA, ANOREXIA, ANEMIA, WEIGHT LOSS, SLEEPLESSNESS, AND DIZZINESS. DEGENERATIVE LIVER AND KIDNEY CHANGES MAY OCCUR LATER. WOMEN MAY BE MORE SUSCEPTIBLE TO THE SYSTEMIC EFFECTS FROM ANTIMONY EXPOSURE. ANTIMONY CROSSES THE PLACENTA, IS PRESENT IN AMNIONIC FLUID, AND IS EXCRETED IN HUMAN MILK.

FIRST AID- IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC (KEEPING THE HEAD BELOW THE HIPS TO PREVENT ASPIRATION), FOLLOWED BY WATER. REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

ANTIMONY POISONING:

ADMINISTER DIMERCAPROL, 3 MG/KG (OR 0.3 ML/10 KG) EVERY 4 HOURS FOR THE FIRST 2 DAYS AND THEN 2 MG/KG EVERY 12 HOURS FOR A TOTAL OF 10 DAYS. DIMERCAPROL IS AVAILABLE AS A 10% SOLUTION IN OIL FOR INTRAMUSCULAR ADMINISTRATION (DREISBACH, HANDBOOK OF POISONING, 11TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

ANTIMONY:

ACIDS: MODERATE TO VIOLENT REACTION.

ALKALINE NITRATES: EXPLOSIVE REACTION POSSIBLE.

ALUMINUM (POWDERED): VIOLENT REACTION ON HEATING.

AMMONIUM NITRATE: EXPLOSIVE REACTION WITH POWDERED ANTIMONY.

AQUA REGIA: READILY ATTACKS ANTIMONY.

BROMINE: SPONTANEOUS IGNITION.

BROMINE PENTAFLUORIDE: CONTACT AT AMBIENT OR SLIGHTLY ELEVATED TEMPERATURES MAY RESULT IN VIOLENT IGNITION.

BROMINE TRIFLUORIDE: VIOLENT REACTION WITH INCANDESCENCE.

BROMOAZIDE: EXPLOSION ON CONTACT.

CHLORIC ACID: FORMS EXPLOSIVE COMPOUND.

CHLORINE (GAS): SPONTANEOUS IGNITION.

CHLORINE (LIQUID): SPONTANEOUS IGNITION AT 33 C.

CHLORINE MONOXIDE (GAS): VIOLENT EXPLOSION ON CONTACT.

CHLORINE TRIFLUORIDE: CONTACT AT AMBIENT OR SLIGHTLY ELEVATED TEMPERATURES MAY RESULT IN VIOLENT IGNITION.

DICHLORINE OXIDE: EXPLOSION ON CONTACT.

DISULFUR DIBROMIDE: VIOLENT REACTION WITH FINELY DIVIDED ANTIMONY.

FLUORINE: SPONTANEOUS IGNITION.
HALOGENATED ACIDS: INCOMPATIBLE.
IODINE: IGNITION REACTION; LARGE AMOUNTS MAY RESULT IN EXPLOSION.
IODINE PENTAFLUORIDE: INCANDESCENT REACTION.
NITRATE SALTS: VIGOROUS OR VIOLENT REACTION.
NITRIC ACID: VIOLENT REACTION WITH FINELY DIVIDED ANTIMONY.
NITROSYL FLUORIDE: INCANDESCENT REACTION.
OXIDIZERS: FIRE AND EXPLOSION HAZARD.
PERCHLORIC ACID: HAZARDOUS REACTION WITH TRIVALENT ANTIMONY.
PEROXIDES (MIXTURES): MAY REACT EXPLOSIVELY.
POTASSIUM DIOXIDE: OXIDATION REACTION WITH INCANDESCENCE.
POTASSIUM NITRATE: EXPLOSIVE REACTION WITH POWDERED ANTIMONY.
POTASSIUM PERMANGANATE: IGNITES ON GRINDING IN MORTAR.
POTASSIUM PEROXIDE: FORMATION OF EXPLOSIVE MIXTURE.
SELENINYL CHLORIDE: IGNITION ON CONTACT WITH POWDERED ANTIMONY.
SODIUM NITRATE: EXPLOSIVE REACTION WITH POWDERED ANTIMONY.
SODIUM PEROXIDE: FORMATION OF EXPLOSIVE MIXTURE ON HEATING.
SULFURIC ACID: READILY ATTACKED.

DECOMPOSITION:

ANTIMONY:

MAY RELEASE TOXIC STIBINE GAS UNDER THERMAL DECOMPOSITION. STIRRED ANTIMONY HALIDE YIELDS EXPLOSIVE ANTIMONY.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. PREVENT DISPERSION OF DUST IN AIR. DO NOT ALLOW SPILLED MATERIAL TO CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANTIMONY AND COMPOUNDS (AS SB):

5 MG/M3- ANY DUST AND MIST RESPIRATOR, EXCEPT SINGLE USE AND QUARTER-MASK RESPIRATORS.

ANY SUPPLIED-AIR RESPIRATOR.

ANY SELF-CONTAINED BREATHING APPARATUS.

12.5 MG/KG- ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER, IF NOT PRESENT AS A FUME.

ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

25 MG/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

80 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.
ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 09/11/84 REVISION DATE: 03/19/92

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AMERICIUM-241 MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS01003

CAS#: 14596-10-2 FORMULA: AM

AMERICIUM-241 IS A SILVER-WHITE SOLID.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH. SEE CODE OF FEDERAL REGULATIONS FOR OSHA STANDARDS CONCERNING EXPOSURE TO RADIOACTIVE SUBSTANCES.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE. FOR SMALL FIRES: USE DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM.

FOR LARGE FIRES: USE WATER SPRAY, FOG (FLOODING AMOUNTS).

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE REDNESS AND SWELLING OF THE EYES. ADDITIONAL EFFECTS MAY INCLUDE CHANGES IN SKIN COLOR, NAUSEA, VOMITING, DIARRHEA, SLEEPINESS, INCOORDINATION, TWITCHING, SEIZURES, AND BLOOD, SKIN, STOMACH, AND INTESTINAL DAMAGE. MAY CAUSE REPRODUCTIVE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, EYE DAMAGE AND CANCER MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. NO INFORMATION AVAILABLE.

SPILL OR LEAK:

DO NOT TOUCH DAMAGED CONTAINERS OR SPILLED MATERIAL. DAMAGE TO OUTER CONTAINER MAY NOT AFFECT PRIMARY INNER CONTAINER. FOR SMALL LIQUID SPILLS TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGE SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AT LEAST 150 FEET UPWIND; GREATER DISTANCES MAY BE NECESSARY IF ADVISED BY A QUALIFIED RADIATION AUTHORITY. ISOLATE HAZARD AREA AND DENY ENTRY. ENTER SPILL AREA ONLY TO SAVE LIFE; LIMIT ENTRY TO SHORTEST POSSIBLE TIME. DETAIN UNINJURED PERSONS AND EQUIPMENT EXPOSED TO RADIOACTIVE MATERIAL UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY. DELAY CLEAN-UP UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY.

CERCLA REPORTABLE QUANTITY: 0.01 CI (3.7E 8BQ) POUND(S).

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS01003
14596-10-2
AMERICIUM-241

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OHS01003

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: AMERICIUM-241

CAS NUMBER: 14596-10-2

TRADE NAMES/SYNONYMS:

AMERICIUM, ISOTOPE OF MASS 241; AM-241; AM; OHS01003

CHEMICAL FAMILY:

RADIOACTIVE

METAL

MOLECULAR FORMULA: AM

MOLECULAR WEIGHT: 241

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: AMERICIUM-241
CAS# 14596-10-2

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

OCCUPATIONAL EXPOSURE TO RADIOACTIVE SUBSTANCES MUST ADHERE TO STANDARDS
ESTABLISHED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION,
29 CFR 1910.96, AND/OR THE NUCLEAR REGULATORY COMMISSION, 10 CFR PART 20.

AMERICIUM-241:

0.01 CI (3.7E 8 BQ) CERCLA SECTION 103 REPORTABLE QUANTITY.

PHYSICAL DATA

DESCRIPTION: SILVER-WHITE, HEXAGONAL (ALPHA FORM) OR CUBIC (BETA FORM)

CRYSTALLINE SOLID. BOILING POINT: 4725 F (2607 C)

MELTING POINT: 1814-1828 F (990-998 C) SPECIFIC GRAVITY: 13.67

SOLUBILITY IN WATER: NOT AVAILABLE

SOLVENT SOLUBILITY: SOLUBLE IN DILUTE ACIDS.

HALF-LIFE: 458 YEARS

SPECIFIC ACTIVITY: 3.2 CI/GM

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY OR FOG (FLOODING AMOUNTS) (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT MOVE DAMAGED CONTAINERS; MOVE UNDAMAGED CONTAINERS OUT OF FIRE ZONE. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 63).

CONTACT THE LOCAL, STATE, OR DEPARTMENT OF ENERGY RADIOLOGICAL RESPONSE TEAM. EXTINGUISH USING AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING DUSTS OR VAPORS, KEEP UPWIND. KEEP UNNECESSARY PEOPLE OUT OF AREA UNTIL DECLARED SAFE BY RADIOLOGICAL RESPONSE TEAM.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
RADIOACTIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
RADIOACTIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.415 AND
49 CFR 173.416

EXCEPTIONS: 49 CFR 173.421; 49 CFR 173.422 AND 49 CFR 173.424

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
RADIOACTIVE MATERIAL, N.O.S.-UN 2982

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
7 - RADIOACTIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
RADIOACTIVE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.421 AND 49 CFR 173.422
NON-BULK PACKAGING: 49 CFR 173.415 AND 49 CFR 173.416
BULK PACKAGING: 49 CFR 173.415 AND 49 CFR 173.416

TOXICITY

AMERICIUM-241:

CARCINOGEN STATUS: NONE. HOWEVER, EXPOSURE TO IONIZING RADIATION MAY CAUSE CANCER.

ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.

TARGET EFFECTS: POISONING MAY AFFECT THE BONES, LUNGS, LIVER AND KIDNEYS.

ADDITIONAL DATA: AMERICIUM-241 IS AN EMITTER OF ALPHA PARTICLES AND IN GRAM QUANTITIES EMITS GAMMA RADIATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:

AMERICIUM-241:

EXPOSURE OF RATS TO <10 TO >500 RADS FOR 30 MINUTES PRODUCED LUNG LESIONS WITH PROGRESSIVE DISRUPTION AND DESTRUCTION OF STRUCTURES WITH INFLAMMATORY AND ALVEOLAR FIBROSIS. LUNG TUMORS WERE PRECEDED BY ADENOMATOSIS AND SQUAMOUS CELL METAPLASIA. TUMORS WERE PERIPHERAL. EARLY MORTALITY DUE TO RADIATION PNEUMONITIS WAS SEEN ONLY IN THE GROUP EXPOSED TO OVER 500 RADS. AMERICIUM HAS BEEN REPORTED TO ACCUMULATE IN THE BONES, LIVER AND KIDNEYS. SEE ALSO INFORMATION ON ALPHA AND GAMMA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- ALPHA RADIATION IS DENSELY IONIZING WITH VERY HIGH ENERGY AND WILL KILL CELLS IMMEDIATELY ADJACENT TO THE SOURCE OF CONTACT. DAMAGED CELLS MAY NOT RECOVER OR BE REPAIRED. ALPHA EMITTERS MAY OR MAY NOT BE ABSORBED, DEPENDING ON THE SOLUBILITY AND PARTICLE SIZE. INSOLUBLE COMPOUNDS MAY REMAIN AT OR NEAR THE SITE OF DEPOSITION, AND SOLUBLE COMPOUNDS MAY RAPIDLY ENTER THE BLOODSTREAM. HEAVIER PARTICLES WILL BE BROUGHT UP TO THE THROAT BY CILIARY ACTION, AND MAY THEN BE SWALLOWED. THE LIGHTER PARTICLES MAY BE LODGED DEEP IN THE ALVEOLAR AIR SACS AND REMAIN.

THE DAMAGE DEPENDS ON HOW QUICKLY THEY ARE ELIMINATED, AND THE SUSCEPTIBILITY OF THE TISSUE IN WHICH THEY ARE STORED. A SINGLE LARGE DOSE OF RADIATION MAY LEAD TO RADIATION SICKNESS.

CHRONIC EXPOSURE- THE EFFECTS OF CHRONIC EXPOSURE BY INTERNALLY DEPOSITED ALPHA RADIATION IS DEPENDENT UPON THE DOSE AND TARGET ORGAN(S). IF THE TOTAL DOSE IS SUFFICIENT, RADIATION SICKNESS MAY OCCUR. POSSIBLE DISORDERS INCLUDE LUNG CANCER, STERILITY, ANEMIA, LEUKEMIA, OR BONE CANCER.

GAMMA RADIATION:

ACUTE EXPOSURE- GAMMA RADIATION IS HIGHLY ENERGETIC AND PENETRATING. IT MAY DAMAGE ANY PART OF THE BODY SINCE THE EFFECTS OF GAMMA RADIATION ARE INDEPENDENT OF THE LOCATION OF THE GAMMA EMITTER. INSOLUBLE MATERIALS MAY BE RETAINED AT OR NEAR THE SITE OF DEPOSITION, WHERE THEY COMPLETE THE DECAY PROCESS. INSOLUBLE MATERIALS MAY BE LODGED NEAR THE THROAT AND SWALLOWED. SMALLER INSOLUBLE PARTICLES MAY BECOME LODGED DEEP IN THE LUNGS WHERE THEY WILL REMAIN OR BE TRANSPORTED TO THE LYMPH NODES. SOLUBLE SUBSTANCES MAY BE ABSORBED INTO THE BLOODSTREAM TRANSPORTED TO AN ORGAN OR TISSUE WHERE THEY COMPLETE THE DECAY PROCESS. A SINGLE EXPOSURE TO 300-400 RADS CAN CAUSE STERILIZATION IN YOUNG WOMEN.

CHRONIC EXPOSURE- A DOSE ON THE ORDER OF 1000-2000 RADS, ADMINISTERED IN FRACTIONATED EXPOSURE OVER A PERIOD OF 10-14 DAYS, MAY CAUSE STERILIZATION IN YOUNG WOMEN. ANIMAL EXPERIMENTS SHOWED THAT DAILY EXPOSURE IN THE 10-40 RAD RANGE, ANEMIA WAS THE MAJOR CAUSE OF DEATH. WITH PROTRACTED EXPOSURES BELOW 10 RADS PER DAY, MYELOPROLIFERATIVE DISEASES, POTENTIALLY LEUKEMIC, WERE THE MAJOR CAUSE OF DEATH. IF THE TOTAL DOSE OF RADIATION IS SUFFICIENT, RADIATION SICKNESS MAY OCCUR. POSSIBLE DISORDERS INCLUDE LUNG CANCER, STERILITY, ANEMIA, LEUKEMIA, OR BONE CANCER.

RADIATION SICKNESS:

ACUTE EXPOSURE- WHOLE BODY DOSES OF 200-1000 RADS MAY CAUSE ANOREXIA, APATHY, NAUSEA AND VOMITING AND MAY BECOME MAXIMAL WITHIN 6-12 HOURS. AN ASYMPTOMATIC PERIOD OF 24-36 HOURS MAY BE FOLLOWED BY LYMPHOPENIA AND SLOWLY DEVELOPING NEUTROPENIA. THROMBOCYTOPENIA MAY BECOME PROMINENT WITHIN 3-4 WEEKS. THE LYMPH NODES, SPLEEN AND BONE MARROW MAY BEGIN TO ATROPHY. IF BONE MARROW DEPRESSION REACHES A CRITICAL LEVEL, DEATH MAY OCCUR FROM OVERWHELMING INFECTION. WHOLE BODY DOSES OF 400 OR MORE RADS MAY CAUSE INTRACTABLE NAUSEA, VOMITING AND DIARRHEA THAT MAY LEAD TO SEVERE DEHYDRATION, VASCULAR COLLAPSE AND DEATH. REGENERATION OF THE INTESTINAL EPITHELIUM MAY OCCUR, BUT MAY BE FOLLOWED BY HEMATOPOIETIC FAILURE WITHIN 2-3 WEEKS. WHOLE BODY DOSES OF 600 OR MORE RADS MAY BE FATAL DUE TO GASTROINTESTINAL OR HEMATOPOIETIC MALFUNCTION. WITH DOSES <600 RADS, THE POSSIBILITY OF SURVIVAL IS INVERSELY RELATED TO THE DOSE. WHOLE BODY DOSES >3000 RADS GENERALLY CAUSE NAUSEA, VOMITING, LISTLESSNESS, DROWSINESS RANGING FROM APATHY TO PROSTRATION, TREMORS, CONVULSIONS, ATAXIA AND DEATH WITHIN A FEW HOURS. THE GONADS ARE ALSO PARTICULARLY RADIOSENSITIVE. A SINGLE DOSE OF 30 RADS RESULTS IN TEMPORARY STERILITY AMONG MEN. IN WOMEN, LOSS OF FERTILITY MAY BE INDICATED BY LOSS OF MENSTRUATION.

CHRONIC EXPOSURE- THE DELAYED EFFECTS OF RADIATION MAY BE DUE EITHER TO A SINGLE LARGE OVEREXPOSURE OR CONTINUING LOW-LEVEL OVEREXPOSURE AND MAY INCLUDE CANCER, GENETIC EFFECTS, SHORTENING OF LIFE SPAN AND CATARACTS. CANCER IS OBSERVED MOST FREQUENTLY IN THE HEMATOPOIETIC SYSTEM, THYROID, BONE AND SKIN. LEUKEMIA IS AMONG THE MOST LIKELY FORMS OF MALIGNANCY. LUNG CANCER MAY ALSO OCCUR DUE TO RADIOACTIVE MATERIALS RESIDING IN THE

LUNGS. GENETIC EFFECTS MAY RANGE FROM POINT MUTATIONS TO SEVERE CHROMOSOME DAMAGE SUCH AS STRAND BREAKAGE, TRANSLOCATIONS, AND DELETIONS. IF THE GERM CELLS HAVE BEEN AFFECTED, THE EFFECTS OF THE MUTATION MAY NOT BECOME APPARENT UNTIL THE NEXT GENERATION, OR EVEN LATER.

FIRST AID- REMOVE FROM EXPOSURE AREA TO A RESTRICTED AREA WITH FRESH AIR AS QUICKLY AS POSSIBLE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION BY ADMINISTERING OXYGEN; MOUTH-TO-MOUTH RESUSCITATION SHOULD BE AVOIDED TO PREVENT EXPOSURE TO THE PERSON RENDERING FIRST AID. ANY EVIDENCE OF SERIOUS CONTAMINATION INDICATES THAT TREATMENT MUST BE INSTITUTED. (INHALATION OF RADIOACTIVE PARTICLES MAY INDICATE THAT OTHER PARTS OF THE BODY WERE ALSO CONTAMINATED, SUCH AS THE DIGESTIVE TRACT, SKIN AND EYES.) IF TIME PERMITS, WIPE THE FACE WITH WET FILTER PAPER, FORCE COUGHING AND BLOWING OF THE NOSE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA #3, PG. 65)

!! WARNING!!

THE VICTIM MAY BE CONTAMINATED WITH RADIOACTIVE PARTICLES. THOROUGH DECONTAMINATION SHOULD BE STARTED BEFORE THE VICTIM IS MOVED TO THE MEDICAL AREA.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID MUST BE MONITORED FOR RADIOACTIVITY AND THOROUGHLY DECONTAMINATED IF NECESSARY (IAEA #3, PG.65).

SKIN CONTACT:

AMERICIUM-241:

SEE INFORMATION ON ALPHA AND GAMMA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- ALPHA RADIATION IS NOT USUALLY AN EXTERNAL HAZARD. HOWEVER, LOCAL DAMAGE MAY OCCUR AT THE SITE OF A WOUND. ABSORPTION OR PENETRATION THROUGH DAMAGED SKIN MAY RESULT IN RADIATION SICKNESS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED CONTACT MAY RESULT IN RADIATION SICKNESS.

GAMMA RADIATION:

ACUTE EXPOSURE- THERE ARE THREE STAGES OF ACUTE RADIODERMATITIS THAT MAY RESULT FROM EXPOSURE TO GAMMA RADIATION. (1) RADIODERMATITIS ERYTHEMATOSA MANIFESTS ITSELF IN A REDDENING OF THE SKIN BEGINNING ON THE FOURTH TO SEVENTH DAY. ONLY IN THE THIRD TO FOURTH WEEK DOES THE SKIN REGAIN ITS NORMAL APPEARANCE. HAIR FROM HEAD AND BEARD MAY FALL FROM THE AREAS OF REDDENED SKIN WITHIN TWO OR THREE WEEKS. THE SKIN REMAINS TEMPORARILY COLORED, PEELS EASILY, AND IS DRY. (2) RADIODERMATITIS BULLOSA OCCURS AFTER LARGE DOSES. BETWEEN THE SECOND AND FIFTH DAYS AFTER EXPOSURE, THE SKIN BECOMES DARK VIOLET IN COLOR AND WATER BLISTERS, SIMILAR TO SECOND DEGREE BURNS, ARE FORMED. THE SKIN ITCHES, BURNS AND IS PAINFUL. WITHIN TWO OR THREE WEEKS, THE HAIR FALLS OUT AND THE LOSS IS LARGELY PERMANENT. HEALING IS SLOW, AND THE SKIN THEREAFTER REMAINS DRY, WHITISH, AND CROSSED WITH BRIGHT-RED BLOOD VESSELS. (3) RADIODERMATITIS ESCHAROTICA OCCURS AFTER EXTREMELY HIGH DOSES. THE SKIN REDDENING APPEARS AS EARLY AS THE SECOND OR THIRD DAY AFTER EXPOSURE. DEEP AND PAINFUL ULCERS AND ABSCESSSES APPEAR ON THE SKIN, HEALING IS SLOW, AND SCARS, INTERWOVEN WITH WITH LARGE BLOOD VESSELS, REMAIN ON THE DAMAGED AREAS. THE SKIN IS DRY, SINCE THE SEBACEOUS AND SWEAT GLANDS HAVE BEEN COMPLETELY DESTROYED. THE SKIN IS SUBJECT TO CANCER FORMATION AFTER RELATIVELY SEVERE DAMAGE. IN ADDITION TO THESE DIRECT EFFECTS ON THE SKIN, DUE TO THE PENETRATING

ABILITY OF GAMMA RADIATION, EXPOSURE MAY ALSO RESULT IN DAMAGE TO INTERNAL ORGANS, AND RESULT IN THE SYMPTOMS OF RADIATION SICKNESS. CHRONIC EXPOSURE- IF THE CUMMULATIVE DOSE IS SUFFICIENT, THE EFFECTS OF CHRONIC EXPOSURE ARE THE SAME AS DETAILED IN ACUTE EXPOSURE.

RADIATION SICKNESS:

THE CLINICAL COURSE OF RADIATION SICKNESS DEPENDS UPON THE DOSE, DOSE RATE, AREA OF THE BODY AFFECTED AND TIME AFTER EXPOSURE. EXTERNAL AND INTERNAL RADIOACTIVITY OF ANY TYPE MAY CAUSE RADIATION SICKNESS. RADIATION SICKNESS HAS THREE (3) CLEARLY DEFINED SYNDROMES WHICH ARE DESCRIBED IN DETAIL IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A SUITABLE AREA FOR DECONTAMINATION AS QUICKLY AS POSSIBLE. REMOVE CLOTHING AND SHOES IMMEDIATELY. THOROUGHLY WASH THE VICTIM WITH SOAP AND WATER, PAYING PARTICULAR ATTENTION TO THE HEAD, FINGER NAILS AND PALMS OF THE HANDS. UPON COMPLETION OF WASHING, MONITOR THE VICTIM FOR RADIOACTIVITY. IT IS IMPERATIVE THAT THE SKIN SHOULD BE DECONTAMINATED AS QUICKLY AS POSSIBLE. MINUTE SKIN INJURIES GREATLY INCREASE THE DANGER OF ISOTOPE PENETRATION INTO THE VICTIM; SHAVING SHOULD NOT BE ATTEMPTED. IF WATER AND SOAP HAVE BEEN INADEQUATE IN REMOVING THE RADIOACTIVE COMPOUND, DECONTAMINATING COMPOUNDS CONSISTING OF SURFACTANTS AND ABSORBENT SUBSTANCES MAY BE EFFECTIVE. COMPLEXING REAGENTS MAY ALSO BE OF USE. THE USE OF ORGANIC SOLVENTS IS TO BE AVOIDED, AS THEY MAY INCREASE THE SOLUBILITY AND ABSORPTION OF THE RADIOACTIVE SUBSTANCE. SKIN CONTAMINATION WITH RADIATION MAY BE AN INDICATION THAT OTHER PARTS OF THE BODY HAVE BEEN EXPOSED (IAEA # 47, PG.9; IAEA #3, PG. 62).

!! WARNING!!

CONTAMINATED CLOTHING MUST BE STORED IN A METAL CONTAINER FOR LATER DECONTAMINATION OR DISPOSAL. THE WATER USED TO WASH THE VICTIM MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL. ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PG.62).

EYE CONTACT:

AMERICIUM 241:

SEE INFORMATION ON ALPHA AND GAMMA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- RADIATION AFFECTS THE EYE BY INDUCING ACUTE INFLAMMATION OF THE CONJUNCTIVA AND THE CORNEA. THE MOST SENSITIVE PART OF THE EYE IS THE CRYSTALLINE LENS. A LATE EFFECT OF EYE IRRADIATION IS CATARACT FORMATION. IT MAY BEGIN ANYWHERE FROM 6 MONTHS TO SEVERAL YEARS AFTER A SINGLE EXPOSURE. CATARACT FORMATION BEGINS AT THE POSTERIOR POLE OF THE LENS, AND CONTINUES UNTIL THE ENTIRE LENS HAS BEEN AFFECTED. GROWTH OF THE OPACITY MAY STOP AT ANY POINT. THE RATE OF GROWTH AND THE DEGREE OF OPACITY ARE DEPENDENT UPON THE DOSE OF RADIATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO ALPHA RADIATION MAY RESULT IN CATARACT FORMATION, AS DESCRIBED ABOVE. OF THE WELL-DOCUMENTED LATE EFFECTS OF RADIATION ON MAN, LEUKEMIA AND CATARACTS HAVE BEEN OBSERVED AT DOSES LOWER THAN THOSE PRODUCING SKIN SCARRING AND CANCER OR BONE TUMORS. THE LENS OF THE EYE SHOULD BE CONSIDERED TO BE A CRITICAL ORGAN.

GAMMA RADIATION:

ACUTE EXPOSURE- ANY RADIATION AFFECTS THE EYE BY INDUCING ACUTE INFLAMMATION OF THE CONJUNCTIVA AND THE CORNEA. THE MOST SENSITIVE PART OF THE EYE IS THE CRYSTALLINE LENS. CATARACT FORMATION MAY BEGIN ANYWHERE FROM 6 MONTHS TO SEVERAL YEARS AFTER EXPOSURE TO RADIATION.

THE CATARACT BEGINS AT THE POSTERIOR POLE OF THE LENS AND CONTINUES INWARD UNTIL THE ENTIRE LENS HAS BEEN AFFECTED. GROWTH OF THE OPACITY MAY STOP AT ANY POINT. THE RATE OF GROWTH AND THE DEGREE OF OPACITY ARE DEPENDENT UPON THE DOSE AS WELL AS THE TYPE OF RADIATION.

APPROXIMATELY 200 RADS OF GAMMA RADIATION IN A SINGLE DOSE IS REQUIRED TO PRODUCE OPACITIES IN THE HUMAN LENS. THE VALUE OF 200 RADS IS PROBABLY CLOSE TO THE MAXIMUM SINGLE DOSE THAT PRODUCES OPACITIES THAT DO NOT INTERFERE WITH VISION.

CHRONIC EXPOSURE- CHRONIC EXPOSURE TO GAMMA RADIATION MAY CAUSE CATARACTS, AS DESCRIBED ABOVE. APPROXIMATELY 400 TO 550 RADS ARE REQUIRED TO PRODUCE DETECTABLE OPACITIES, DEPENDING ON THE FRACTIONATION OF EXPOSURE TIME. OF THE WELL-DOCUMENTED LATE EFFECTS OF RADIATION ON MAN, LEUKEMIA AND CATARACTS HAVE BEEN OBSERVED AT DOSES LOWER THAN THOSE REQUIRED TO PRODUCE SKIN SCARRING AND CANCER OR BONE TUMORS. THE LENS OF THE EYE SHOULD BE CONSIDERED TO BE A CRITICAL ORGAN.

RADIATION SICKNESS:

THE EYES ARE VERY RADIOSENSITIVE; A SINGLE DOSE OF 100 RADS MAY CAUSE CONJUNCTIVITIS AND KERATITIS.

IT IS UNLIKELY THAT A DOSE SUFFICIENT TO CAUSE RADIATION SICKNESS WOULD OCCUR IF ONLY THE EYES WERE IRRADIATED. HOWEVER, IF EYE DAMAGE BY IONIZING RADIATION OCCURS, IT MAY BE BEST TO ASSUME THAT OTHER PARTS OF THE BODY HAVE ALSO BEEN CONTAMINATED. SYMPTOMS OF RADIATION SICKNESS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A RESTRICTED AREA FOR DECONTAMINATION.

THOROUGHLY WASH EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE THE UPPER AND LOWER LIDS (APPROXIMATELY 15 MINUTES). FOLLOWING THE WATER TREATMENT, PROVIDE AN ISOTONIC SOLUTION. DO NOT USE EYEBATHS, RATHER PROVIDE A CONTINUOUS AND COPIOUS SUPPLY OF FLUID. MONITOR THE VICTIM FOR RADIOACTIVITY. IF ACTIVITY IS PRESENT, REWASH THE EYES, AND REMONITOR UNTIL LITTLE OR NO RADIOACTIVITY IS PRESENT. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 3, PG. 65; IAEA # 47, PG. 35).

!! WARNING!!

ANY WATER USED TO WASH THE VICTIMS EYES MUST BE STORED IN A METAL CONTAINER FOR LATER DISPOSAL. ANY OTHER ARTICLES THAT ARE USED TO DECONTAMINATE THE VICTIM MUST ALSO BE STORED IN METAL CONTAINERS FOR LATER DECONTAMINATION OR DISPOSAL.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #3, PG.65; IAEA # 47, PG. 35).

INGESTION:

AMERICIUM 241:

ACCIDENTAL INGESTION BY A WOMAN OF TWO DISCS OF AM-241 RESULTED IN A SYSTEMIC BURDEN OF 1.5%. AFTER THE DISCS WERE VOIDED, URINE SAMPLES SHOWED NO PRESENCE OF AM-241. SEE INFORMATION OF ALPHA AND GAMMA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- THE FATE OF INGESTED ALPHA EMITTERS DEPENDS ON THEIR SOLUBILITY AND VALENCE. HIGH DOSES MAY LEAD TO RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

CHRONIC EXPOSURE- REPEATED INGESTION OF ALPHA EMITTERS MAY LEAD TO RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

GAMMA RADIATION:

ACUTE EXPOSURE- INGESTION OF SUFFICIENT AMOUNTS MAY PRODUCE RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

CHRONIC EXPOSURE- REPEATED INGESTION MAY CAUSE RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

RADIATION SICKNESS:

THE SYMPTOMS OF RADIATION SICKNESS DEPENDS UPON THE DOSE RECEIVED. IT MAY RESULT FROM ACUTE OR CHRONIC EXPOSURE TO ANY FORM OF RADIATION. THE SYMPTOMS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID: IN THE CASE OF INGESTION OF RADIOACTIVE SUBSTANCES, THE MOUTH SHOULD BE RINSED OUT IMMEDIATELY AFTER THE ACCIDENT, CARE BEING TAKEN NOT TO SWALLOW THE WATER USED FOR THIS PURPOSE. VOMITING SHOULD BE INDUCED EITHER MECHANICALLY, OR WITH SYRUP OF IPECAC. DO NOT INDUCE VOMITING IN AN UNCONSCIOUS PERSON. LAVAGE MAY BE USEFUL. CARE SHOULD BE TAKEN TO AVOID ASPIRATION. THE VOMITUS AND LAVAGE FLUIDS SHOULD BE SAVED FOR EXAMINATION AND MONITORING. FURTHER ACTION DEPENDS ON THE NATURE OF THE RADIOACTIVE SUBSTANCE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 47, PG.9; IAEA #47, PG.9; IAEA # 3, PP. 59,66).

!!WARNING!!

THE GASTRIC FLUIDS AND FLUIDS USED FOR LAVAGE MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL. THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED, IF NECESSARY, BEFORE BEING TRANSPORTED TO A MEDICAL FACILITY.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PP. 59,66).

ANTIDOTE:

THERE IS NO ANTIDOTE FOR RADIATION SICKNESS. TREATMENT SHOULD BE SYMPTOMATIC AND SUPPORTATIVE, REGARDLESS OF THE DOSE RECEIVED. IN ALL CASES, MEDICAL ATTENTION SHOULD BE OBTAINED IMMEDIATELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
AMERICIUM-241:
NO DATA AVAILABLE.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE IN ACCORDANCE WITH 10 CFR 20.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH 10 CFR 20 AND 60.

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

RADIATION HAZARD, DO NOT ALLOW MATERIAL TO SPREAD OR CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
DO NOT TOUCH DAMAGED CONTAINERS OR SPILLED MATERIAL. DAMAGE TO OUTER CONTAINER MAY NOT AFFECT PRIMARY INNER CONTAINER. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGE SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AT LEAST 150 FEET UPWIND; GREATER DISTANCES MAY BE NECESSARY IF ADVISED BY QUALIFIED RADIATION AUTHORITY. ISOLATE HAZARD AREA AND DENY ENTRY. ENTER SPILL AREA ONLY TO SAVE LIFE; LIMIT ENTRY TO SHORTEST POSSIBLE TIME. DETAIN UNINJURED PERSONS AND EQUIPMENT EXPOSED TO RADIOACTIVE MATERIAL UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY. DELAY CLEANUP UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

ONE METHOD OF CONTROLLING EXTERNAL RADIATION EXPOSURE IS TO PROVIDE ADEQUATE SHIELDING. THE ABSORBING MATERIAL USED AND THE THICKNESS REQUIRED TO ATTENUATE THE RADIATION TO ACCEPTABLE LEVELS DEPENDS ON THE TYPE OF RADIATION, ITS ENERGY, THE FLUX AND THE DIMENSIONS OF THE SOURCE.

ALPHA PARTICLES- FOR THE ENERGY RANGE OF ALPHA PARTICLES USUALLY ENCOUNTERED, A FRACTION OF A MILLIMETER OF ANY ORDINARY MATERIAL IS SUFFICIENT FOR ABSORBANCE. THIN RUBBER, ACRYLIC, STOUT PAPER, OR CARDBOARD WILL SUFFICE.

BETA PARTICLES- BETA PARTICLES ARE MORE PENETRATING THAN ALPHA, AND REQUIRE MORE SHEILDING. MATERIALS COMPOSED MOSTLY OF ELEMENTS OF LOW ATOMIC NUMBER SUCH AS ACRYLIC, ALUMINUM AND THICK RUBBER ARE MOST APPROPRIATE FOR THE ABSORPTION OF BETA PARTICLES. FOR EXAMPLE, 1/4 INCH OF ACRYLIC WILL ABSORB ALL BETA PARTICLES UP TO 1 MEV. WITH HIGH ENERGY BETA RADIATION FROM LARGE SOURCES, BREMSSTRAHLUNG (X RAY PRODUCTION) CONTRIBUTION MAY BECOME SIGNIFICANT AND IT MAY BE NECESSARY TO PROVIDE ADDITIONAL SHEILDING OF HIGH ATOMIC WEIGHT MATERIAL, SUCH AS LEAD, TO ATTENUATE THE BREMSSTRAHLUNG RADIATION.

GAMMA RAYS- THE MOST SUITABLE MATERIALS FOR SHIELDING GAMMA RADIATION ARE LEAD AND IRON. THE THICKNESS REQUIRED WILL DEPEND ON WHETHER THE SOURCE IS PRODUCING NARROW OR BROAD BEAM RADIATION. PRIMARY AND SECONDARY PROTECTIVE BARRIERS MAY BE REQUIRED TO BLOCK ALL RADIATION.

RESPIRATOR:

THESE RECOMMENDED RESPIRATORS SHOULD PROVIDE PROTECTION FOR THE RESPIRATORY TRACT AGAINST MOST OF THE RADIOACTIVE PARTICLES ENCOUNTERED IN THE WORK PLACE. THESE RESPIRATORS WILL NOT OFFER PROTECTION AGAINST BETA AND GAMMA RADIATION, BUT MAY BLOCK ALPHA PARTICLES. FROM 10CFR20.103 APPENDIX A. RESPIRATORY EQUIPMENT MUST BE CERTIFIED BY NIOSH/MSHA.

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.

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH 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.

CLOTHING:

DISPOSABLE OVERGARMENTS, INCLUDING HEAD COVERINGS AND FOOT COVERING, SHOULD BE WORN BY ANY EMPLOYEE ENGAGED IN HANDLING ANY RADIOACTIVE SUBSTANCE. THESE GARMENTS ARE ALSO RECOMMENDED EVEN IF THE EMPLOYEE IS WORKING WITH A "GLOVE BOX" CONTAINMENT SYSTEM. CERTAIN CLOTHING FIBERS MAY BE USEFUL IN DOSIMETRY SO CLOTHING SHOULD BE KEPT.

IN THE EVENT OF AN ACCIDENT, LARGE SCALE RELEASE OR A LARGE SCALE CLEAN-UP FULL PROTECTIVE CLOTHING WILL BE NECESSARY.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

WARNING!

USED GLOVES MAY PRESENT A RADIATION HAZARD AND SHOULD BE DISPOSED OF AS RADIOACTIVE WASTE.

EYE PROTECTION:

EMPLOYEE MUST WEAR APPROPRIATE EYE PROTECTION THAT WILL NOT ALLOW THE INTRODUCTION OF PARTICLES INTO THE EYES. CONTACT LENSES SHOULD NOT BE WORN.

CLOTHING, GLOVE, AND EYE PROTECTION EQUIPMENT WILL PROVIDE PROTECTION AGAINST ALPHA PARTICLES, AND SOME PROTECTION AGAINST BETA PARTICLES, DEPENDING ON THICKNESS, BUT WILL NOT SHIELD GAMMA RADIATION.

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CREATION DATE: 06/18/91 REVISION DATE: 02/25/92

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ARSENIC MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS01980

CAS#: 7440-38-2 FORMULA: AS

ARSENIC IS A SILVER TO BLACK SOLID WITH A GARLIC ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, CHEST, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE TEARING, COUGHING, CHEST PAIN, DIFFICULTY BREATHING, BLUISH COLOR OF THE SKIN, LIPS, AND FINGERNAILS, GARLIC BREATH, HEADACHE, WEAKNESS, NAUSEA, VOMITING, DIARRHEA, MUSCLE PAIN, LOW BLOOD PRESSURE, DIZZINESS, IRREGULAR HEARTBEAT, COLDNESS, SEIZURES, UNCONSCIOUSNESS, AND DEATH.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES AND HAIR LOSS MAY OCCUR. MAY CAUSE NERVE DAMAGE AND CANCER.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ALL WET CLOTHING OR SHOES. WIPE THE SUBSTANCE FROM THE SKIN. WASH EXPOSED PARTS WITH FLOODING AMOUNTS OF WATER AND SOAP. FLUSH EYES WITH FLOODING AMOUNTS OF WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS01980
7440-38-2
ARSENIC

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OHS01980

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-38-2
RTECS NUMBER: CG0525000

SUBSTANCE: ARSENIC, SOLID

TRADE NAMES/SYNONYMS:

ARSENIC; ARSENIC-75; ARSENIC BLACK; COLLOIDAL ARSENIC; METALLIC ARSENIC;
GREY ARSENIC; ARSENIC, METALLIC; STCC 4923207; UN 1558; OHS01980

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: AS

MOLECULAR WEIGHT: 74.92

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ARSENIC
CAS# 7440-38-2

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ARSENIC:

10 UG/M3 OSHA TWA
200 UG/M3 ACGIH TWA
2 UG/M3 NIOSH RECOMMENDED 15 MINUTE CEILING

1 POUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (FEBRUARY 27, 1987)

PHYSICAL DATA

DESCRIPTION: SILVERY TO BLACK, BRITTLE SOLID WITH ODOR OF GARLIC.

BOILING POINT: SUBLIMES @ 1135 F MELTING POINT: 814 C @ 36 ATM

SPECIFIC GRAVITY: 5.6-5.9 VAPOR PRESSURE: NOT AVAILABLE

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN NITRIC ACID

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY
RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 53).

EXTINGUISH USING AGENT INDICATED, USE WATER IN FLOODING QUANTITIES AS A
FOG. AVOID BREATHING DUSTS AND FUMES; KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
POISON B

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
POISON

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.366
EXCEPTIONS: 49 CFR 173.364

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
ARSENIC-UN 1558

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 25 KG
CARGO AIRCRAFT ONLY: 100 KG

TOXICITY

ARSENIC:

TOXICITY DATA: 7857 MG/KG/55 YEARS ORAL-MAN TDLO; 763 MG/KG ORAL-RAT LD50; 145 MG/KG ORAL-MOUSE LD50; 300 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 300 MG/KG SUBCUTANEOUS-RABBIT LDLO; 46,200 UG/KG INTRAPERITONEAL-MOUSE LD50; 10 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: OSHA CARCINOGEN; KNOWN HUMAN CARCINOGEN (NTP); HUMAN SUFFICIENT EVIDENCE, ANIMAL LIMITED EVIDENCE (IARC GROUP-1). AN INCREASED INCIDENCE OF SKIN AND LUNG CANCER HAS BEEN ASSOCIATED WITH INORGANIC ARSENIC COMPOUNDS THROUGH MEDICAL TREATMENT, CONTAMINATED DRINKING WATER OR OCCUPATIONAL EXPOSURE. CANCERS AT OTHER SITES HAVE ALSO BEEN REPORTED, BUT A CLEAR ASSOCIATION HAS NOT BEEN CONFIRMED.
LOCAL EFFECTS DATA: IRRITANT- INHALATION, SKIN, EYE
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION.
TARGET EFFECTS: NEUROTOXIN; SENSITIZER- DERMAL. POISONING MAY ALSO AFFECT THE LIVER, KIDNEYS, HEART AND THE GASTROINTESTINAL, HEMATOPOIETIC, AND ENDOCRINE SYSTEM.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING DIABETES, CARDIOVASCULAR DISEASES, ALLERGIC OR OTHER SKIN DISEASES, NEUROLOGIC, HEPATIC OR RENAL LESIONS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

ARSENIC:

IRRITANT/NEUROTOXIN/CARCINOGEN.

ACUTE EXPOSURE- INHALATION OF INORGANIC ARSENIC COMPOUNDS MAY CAUSE SEVERE IRRITATION OF THE NASAL MUCOSA, LARYNX, AND BRONCHI, COUGH WITH FOAMY SPUTUM, PAIN IN THE CHEST ON INSPIRATION, DYSPNEA, LASSITUDE, CYANOSIS, GIDDINESS, HEADACHE, EXTREME GENERAL WEAKNESS, NAUSEA, VOMITING, COLIC,

DIARRHEA, PAIN IN THE LIMBS, INITIAL RISE AND THEN FALL OF TEMPERATURE, LEUCOCYTOSIS, HYPOTENSION, AND POSSIBLY PULMONARY EDEMA. CHRONIC EXPOSURE- MAY CAUSE WEAKNESS, LOSS OF APPETITE, NAUSEA, OCCASIONAL VOMITING, A SENSE OF HEAVINESS IN THE STOMACH, DIARRHEA, SALIVATION, UPPER RESPIRATORY INFLAMMATION AND DISCHARGE, CONJUNCTIVITIS, A CATARRHAL STATE OF THE MUCOUS MEMBRANES OF THE NOSE, LARYNX, AND RESPIRATORY PASSAGES, CORYZA, HOARSENESS, MILD TRACHEOBRONCHITIS, AND PERFORATION OF THE NASAL SEPTUM. SKIN LESIONS MAY OCCUR AND TAKE MANY FORMS INCLUDING INCREASED PIGMENTATION, KERATOSIS OF PALMS AND SOLES ECZEMA-LIKE LESIONS, PALE BANDS ON THE FINGERNAILS, ALOPECIA AND VITILIGO. PERIPHERAL NEURITIS MAY DEVELOP INITIALLY OF THE HANDS AND FEET, WHICH IS USUALLY SENSORY. IN VERY SEVERE CASES, MOTOR PARALYSIS MAY OCCUR; THE FIRST MUSCLES AFFECTED ARE USUALLY THE TOE EXTENSORS AND THE PERONEI, AND IN ONLY THE MOST SEVERE CASES WILL PARALYSIS OF THE FLEXOR MUSCLES OF THE FEET OR OF THE EXTENSOR MUSCLES OF THE HANDS OCCUR. LIVER DISEASE WITH CIRRHOSIS, AND DEPRESSION OF BONE MARROW MAY OCCUR WITH VARIOUS BLOOD DYSCRASIAS INCLUDING APLASTIC ANEMIA. INORGANIC ARSENIC COMPOUNDS HAVE BEEN SHOWN TO BE SKIN AND LUNG CARCINOGENS IN HUMANS. THE LATENCY TIME BETWEEN ONSET OF EXPOSURE AND THE APPEARANCE OF CANCER IS USUALLY BETWEEN 15 AND 30 YEARS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ARSENIC:

IRRITANT/SENSITIZER.

ACUTE EXPOSURE- ARSENIC AND INORGANIC ARSENIC COMPOUNDS IRRITATE THE SKIN WITH ERYTHEMA, ITCHING AND BURNING. SENSITIZATION DERMATITIS MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS, CHARACTERIZED BY ECZEMA WITH SCALING AND HYPERPIGMENTATION OF THE SKIN AND HYPERKERATOSIS OF THE PALMS OF THE HANDS AND THE SOLES OF THE FEET. INORGANIC ARSENIC COMPOUNDS ARE SLIGHTLY ABSORBED THROUGH THE SKIN WHEN ADMINISTERED IN A LIPID VEHICLE. POISONING HAS CAUSED ALOPECIA, BRONZING OF THE SKIN, AND BRITTLE NAILS.

CHRONIC EXPOSURE- OCCUPATIONAL EXPOSURE TO AIRBORNE ARSENIC MAY CAUSE TWO TYPES OF SKIN DISORDERS DUE TO LOCAL IRRITATION. AN ECZEMATOUS TYPE WITH ERYTHEMA, SWELLING AND PAPULES OR VESICLES AND A FOLLICULAR TYPE WITH ERYTHEMA AND FOLLICULAR SWELLING OR FOLLICULAR PUSTULES. DERMATITIS IS USUALLY LOCALISED ON THE MOST HEAVILY EXPOSED AREAS SUCH AS THE FACE, BACK OF THE NECK, FOREARMS, WRISTS AND HANDS. LESS FREQUENTLY THE SCROTUM, THE INNER SURFACES OF THE THIGHS, THE UPPER CHEST AND BACK, AND THE LOWER LEGS AROUND THE ANKLES MAY BE AFFECTED. CHRONIC DERMAL LESIONS MAY FOLLOW THIS TYPE OF INITIAL REACTION BUT USUALLY ONLY AFTER MANY YEARS OF EXPOSURE. HYPERKERATOSIS, WARTS AND MELANOSIS OF THE SKIN ARE CONSPICUOUS SIGNS. IN SEVERE CASES, ARSENMELANOSIS IS OBSERVED ON THE ABDOMEN, CHEST, BACK AND SCROTUM. THESE SKIN LESIONS MAY DEVELOP INTO PRECANCEROUS AND CANCEROUS LESIONS.

FIRST AID- 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.

EYE CONTACT:

ARSENIC:

IRRITANT.

ACUTE EXPOSURE- ARSENICAL DUST MAY CAUSE IRRITATION CHARACTERIZED BY ITCHING, BURNING, WATERING OF THE EYES, PHOTOPHOBIA AND SOMETIMES HYPEREMIA AND CHEMOSIS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EYE CONTACT WITH ARSENIC DUST MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

ARSENIC:

NEUROTOXIN/CARCINOGEN.

ACUTE EXPOSURE- INGESTION OF LARGE DOSES MAY CAUSE SYSTEMIC POISONING WITH DELAYED SYMPTOMS USUALLY APPEARING ONE HOUR AFTER ABSORPTION. SYMPTOMS MAY INCLUDE BURNING AND COLICKY PAINS IN THE ESOPHAGUS, STOMACH AND BOWEL, CONTRICTION IN THE THROAT, DIFFICULTY IN SWALLOWING, MUSCULAR CRAMPS, WEAKNESS, A SWEETISH METALLIC TASTE AND A GARLICKY ODOR OF THE BREATH AND FECES. VIOLENT GASTROENTERITIS MAY OCCUR WITH VOMITING, COPIOUS WATERY OR BLOODY DIARRHEA CONTAINING SHREDS OF MUCUS, AND DEHYDRATION WITH INTENSE THIRST AND MUSCULAR CRAMPS. VERTIGO, FRONTAL HEADACHE, DELIRIUM AND EVEN MANIA MAY DEVELOP WITHOUT PROMINENT GASTROINTESTINAL SIGNS. LATER SYMPTOMS MAY INCLUDE, COLD AND CLAMMY SKIN, FALL IN BLOOD PRESSURE, EXTREME WEAKNESS, EDEMA OF THE FACE AND EYELIDS, TACHYCARDIA, VASOMOTOR COLLAPSE, CONVULSIONS, SHOCK, COMA AND DEATH DUE TO CIRCULATORY FAILURE. DEATH AFTER A FATAL DOSE OCCURS USUALLY BETWEEN 12 AND 48 HOURS. IF THE VICTIM RECOVERS, A SYMMETRICAL PERIPHERAL NEUROPATHY MAY OCCUR WITH NUMBNESS AND PARESTHESIAS BEGINNING IN THE DISTAL EXTREMITIES, LOWER LIMBS BEFORE THE UPPER, WHICH SPREADS RAPIDLY AND INCREASES IN INTENSITY. MOTOR WEAKNESS OF THE DISTAL EXTREMITIES MAY OCCUR AND THE PALSY IS LIKELY TO AFFECT THE LONG EXTENSORS OF FINGERS AND TOES. HORIZONTAL WHITE LINES (STRIATIONS) ON THE FINGERNAILS AND TOENAILS ARE COMMONLY SEEN AND ARE CONSIDERED TO BE A DIAGNOSTIC ACCOMPANIMENT OF ARSENICAL POLYNEURITIS. OTHER ADVERSE EFFECTS SEEN AFTER RECOVERY MAY INCLUDE JAUNDICE, OLIGURIA OR ANURIA, ANEMIA, LEUKOPENIA AND EXFOLIATIVE DERMATITIS. INORGANIC ARSENIC CROSSES THE PLACENTA BARRIER, AND NEONATAL DEATH FROM ARSENIC HAS BEEN REPORTED FOLLOWING ACUTE MATERNAL INTOXICATION.

CHRONIC EXPOSURE- REPEATED INGESTION OF SMALL AMOUNTS MAY CAUSE GASTROINTESTINAL SYMPTOMS SUCH AS DIARRHEA ALTERNATING WITH CONSTIPATION, NAUSEA, VOMITING, ABDOMINAL CRAMPS, SALIVATION, MALAISE, FATIGUE, AND LOSS OF APPETITE AND WEIGHT. DAMAGE TO THE NERVOUS SYSTEM MAY BE APPARENT WITH POLYNEURITIS, ANESTHESIAS, PARESTHESIA SUCH AS BURNING PAINS IN THE HANDS AND FEET, AND OPTIC NEURITIS. THE SKIN MAY BE AFFECTED WITH PIGMENTATION, LOCALIZED EDEMA, DERMATITIS, HYPERKERATOSIS, AND ALOPECIA. EYE INVOLVEMENT MAY OCCUR CAUSING CONJUNCTIVITIS WITH

A SENSATION OF IRRITATION AND TEARING. PIGMENT SPOTS IN THE EPITHELIUM OF BOTH THE CORNEA AND CONJUNCTIVA MAY APPEAR. OTHER SIGNS OF POISONING MAY INCLUDE ANEMIA, LEUKOPENIA, THROMBOCYTOPENIA, DISTURBED ERYTHROPOIESIS IN THE BONE MARROW CELLS, DEPRESSED OR DISTURBED MYELOPOIESIS, HEPATITIS, CIRRHOSIS OR NONCIRRHOTIC PORTAL ENTRY. SKIN AND LUNG CANCER IN HUMANS IS ASSOCIATED WITH CHRONIC EXPOSURE TO ARSENIC. REPEATED ADMINISTRATION TO FEMALE RATS PRIOR TO MATING PRODUCED EFFECTS ON FERTILITY. REPEATED ADMINISTRATION DURING GESTATION PRODUCED SPECIFIC DEVELOPMENTAL ABNORMALITIES IN THE OFFSPRING.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. FOLLOW WITH A SALINE CATHARTIC. MAINTAIN BLOOD PRESSURE, AIRWAY, AND GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.) ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

ARSENIC POISONING:

GIVE DIMERCAPROL, 3 MG/KG (OR 0.3 ML/KG) EVERY 4 HOURS FOR 2 DAYS AND THEN 2 MG/KG EVERY 2 HOURS FOR A TOTAL OF 10 DAYS. DIMERCAPROL IS AVAILABLE AS A 10% SOLUTION IN OIL FOR INTRAMUSCULAR ADMINISTRATION. NEXT, GIVE PENICILLAMINE, UP TO 100 MG/KG/DAY (MAXIMUM 1 G/DAY) DIVIDED INTO 4 DOSES FOR NO LONGER THAN 1 WEEK. IF A LONGER ADMINISTRATION PERIOD IS WARRANTED, DOSAGE SHOULD NOT EXCEED 40 MG/KG/DAY. GIVE THE DRUG ORALLY HALF AN HOUR BEFORE MEALS. DISCONTINUE ANTIDOTE WHEN URINE ARSENIC LEVEL FALLS BELOW 50 UG/24 HR. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

NORMALLY STABLE EVEN UNDER FIRE AND EXPLOSION CONDITIONS.
MAY DARKEN IN MOIST AIR.

INCOMPATIBILITIES:

ARSENIC:

ACIDS: REACTS VIGOROUSLY.
BROMATES: REACTS VIGOROUSLY.
CHLORATES: REACTS VIGOROUSLY.
FLUORINE: REACTS VIGOROUSLY.
HYDROGEN GAS: REACTS VIGOROUSLY.
LITHIUM: REACTS VIGOROUSLY.
OXIDIZING MATERIALS: REACTS VIGOROUSLY.
PALLADIUM: REACTS VIGOROUSLY.
POTASSIUM: REACTS VIGOROUSLY.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND HAZARDOUS FUMES OF ARSINE GAS AND ARSENIC.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****DISPOSAL****

ARSENIC - REGULATORY LEVEL: 5.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D004.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. PREVENT DISPERSION OF DUST IN AIR. DO NOT ALLOW SPILLED MATERIAL TO CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DO NOT HANDLE PACKAGES WITHOUT FULL PROTECTIVE EQUIPMENT.

WATER SPILL:

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 1 POUND

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE

METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROCESS ENCLOSURE RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS.

ARSENIC (INORGANIC):

VENTILATION SHOULD MEET THE REQUIREMENTS IN 29 CFR 1910.1018(G).

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR 1910, SUBPART Z.

RESPIRATORY PROTECTION FOR INORGANIC ARSENIC PARTICULATE EXCEPT THOSE WITH SIGNIFICANT VAPOR PRESSURE

CONCENTRATION OF INORGANIC ARSENIC (AS)
OR CONDITION OF USE

REQUIRED RESPIRATOR

UNKNOWN OR GREATER OR LESS THAN 20,000
UG/M3 (20 MG/M3) OR FIREFIGHTING

ANY FULL FACEPIECE, SELF
CONTAINED BREATHING APPARATUS,
OPERATED IN POSITIVE PRESSURE
MODE.

NOT GREATER THAN 20,000 UG/M3
(20 MG/M3)

SUPPLIED-AIR RESPIRATOR WITH FULL
FACEPIECE, HOOD OR HELMET OR SUIT
AND OPERATED IN POSITIVE PRESSURE
MODE.

NOT GREATER THAN 10,000 UG/M3
(10 MG/M3)

POWERED-AIR PURIFYING RESPIRATORS
IN ALL INLET FACE COVERINGS WITH
HIGH EFFICIENCY FILTERS;
OR
HALF-MASK SUPPLIED-AIR RESPIRATOR
OPERATED IN POSITIVE PRESSURE
MODE.

NOT GREATER THAN 500 UG/M3

FULL FACEPIECE AIR-PURIFYING
RESPIRATOR EQUIPPED WITH HIGH
EFFICIENCY FILTERS;
OR
ANY FULL FACEPIECE SUPPLIED-AIR
RESPIRATOR;
OR
ANY FULL FACEPIECE SELF-CONTAINED
BREATHING APPARATUS.

NOT GREATER THAN 100 UG/M3

HALF-MASK AIR-PURIFYING
RESPIRATOR EQUIPPED WITH HIGH
EFFICIENCY FILTERS;
OR

ANY HALF-MASK SUPPLIED-AIR
RESPIRATOR.

(HIGH EFFICIENCY FILTER- 99.97% EFFICIENCY AGAINST 0.3 MICROMETER MONODISPERSE
DIETHYL-HEXYL PHTHALATE (DOP) PARTICLES)

RESPIRATORY PROTECTION FOR INORGANIC ARSENICALS (SUCH AS ARSENIC TRICHLORIDE
OR ARSENIC PHOSPHIDE) WITH SIGNIFICANT VAPOR PRESSURE.

CONCENTRATION OF INORGANIC ARSENIC (AS)
OR CONDITION OF USE

REQUIRED RESPIRATOR

UNKNOWN OR GREATER OR LESS THAN 20,000
UG/M3 (20 MG/M3)

ANY FULL FACEPIECE SELF-CONTAINED
BREATHING APPARATUS OPERATED IN
POSITIVE PRESSURE MODE.

NOT GREATER THAN 20,000 UG/M3
(20 MG/M3)

SUPPLIED-AIR RESPIRATOR WITH A
FULL FACEPIECE, HOOD OR HELMET OR
SUIT OPERATED IN POSITIVE
PRESSURE MODE.

NOT GREATER THAN 10,000 UG/M3
(10 MG/M3)

HALF-MASK SUPPLIED AIR RESPIRATOR
OPERATED IN POSITIVE PRESSURE
MODE.

NOT GREATER THAN 500 UG/M3

FRONT- OR BACK-MOUNTED GAS MASK
EQUIPPED WITH HIGH-EFFICIENCY
FILTERS AND ACID GAS CANISTER;
OR

ANY FULL FACEPIECE SUPPLIED AIR
RESPIRATOR;

OR

ANY FULL FACEPIECE SELF-CONTAINED
BREATHING APPARATUS.

NOT GREATER THAN 100 UG/M3

HALF-MASK AIR-PURIFYING
RESPIRATOR EQUIPPED WITH HIGH
EFFICIENCY FILTER AND ACID GAS
CARTRIDGE; OR
ANY HALF-MASK SUPPLIED-AIR
RESPIRATOR.

(HIGH EFFICIENCY FILTER- 99.97% EFFICIENCY AGAINST 0.3 MICROMETER MONODISPERSE
DIETHYL-HEXYL PHTHALATE (DOP) PARTICLES)

(HALF-MASK RESPIRATORS SHALL NOT BE USED FOR PROTECTION AGAINST ARSENIC
TRICHLORIDE, AS IT IS RAPIDLY ABSORBED THROUGH THE SKIN).

AT ANY DETECTABLE CONCENTRATION:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION
WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED

IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ACID GAS CANISTER HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

ARSENIC (INORGANIC):

PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1018(J).

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

ARSENIC (INORGANIC):

PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1018(J).

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

ARSENIC (INORGANIC):

PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1018(J).

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CREATION DATE: 09/12/84 REVISION DATE: 02/25/92

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BARIUM METAL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS02270

CAS#: 7440-39-3 FORMULA: BA

BARIUM IS A WHITE OR YELLOW METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE DIZZINESS, DROOLING, COUGHING, DIFFICULTY BREATHING, STOMACH PAIN, VOMITING, BLOODY DIARRHEA, TWITCHING, PARALYSIS, HEART ATTACK, SEIZURES, AND KIDNEY DAMAGE.

LONG TERM EXPOSURE: MAY CAUSE REDNESS AND SWELLING OF THE SKIN AND EYES.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ALL WET CLOTHING OR SHOES. WIPE THE SUBSTANCE FROM THE SKIN. WASH EXPOSED PARTS WITH FLOODING AMOUNTS OF WATER AND SOAP. FLUSH EYES WITH FLOODING AMOUNTS OF WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT WITH WATER GENERATING MUCH HEAT AND DANGEROUS SUBSTANCES. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS02270

7440-39-3

BARIUM METAL

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OHS02270

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-39-3
RTECS NUMBER: CQ8370000

SUBSTANCE: BARIUM METAL

TRADE NAMES/SYNONYMS:

BARIUM; BARIUM, METALLIC; METALLIC BARIUM; BARIUM ELEMENT; UN 1400; BA;
OHS02270

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: BA

MOLECULAR WEIGHT: 137.33

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=2 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: BARIUM
CAS# 7440-39-3

PERCENT: 100.0

OTHER CONTAMINANTS: NONE.

EXPOSURE LIMITS:

BARIUM, SOLUBLE COMPOUNDS (AS BA):

0.5 MG/M3 OSHA TWA
0.5 MG/M3 ACGIH TWA
0.5 MG/M3 NIOSH RECOMMENDED TWA
0.5 MG/M3 DFG MAK TWA (TOTAL DUST);
1.0 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; WATER; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7056).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: SILVER-WHITE OR YELLOWISH-WHITE, LUSTROUS METAL.

BOILING POINT: 2984 F (1640 C) MELTING POINT: 1337 F (725 C)

SPECIFIC GRAVITY: 3.51 VAPOR PRESSURE: 10 MMHG @ 1049 C

SOLUBILITY IN WATER: REACTS

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL; INSOLUBLE IN BENZENE.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FINELY DIVIDED MATERIAL MAY IGNITE ON EXPOSURE TO AIR.

FIREFIGHTING MEDIA:

DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

EXTINGUISH USING AGENTS INDICATED. DO NOT GET WATER INSIDE CONTAINERS. AVOID BREATHING VAPORS FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180), DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204. EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE

EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
BARIUM-UN 1400

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
DANGEROUS WHEN WET

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.241

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 15 KG
CARGO AIRCRAFT ONLY: 50 KG

TOXICITY

BARIUM METAL:
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: POISONING MAY AFFECT THE HEART AND KIDNEYS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
BARIUM:
IRRITANT. 250 MG/M3 IS IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- MAY CAUSE SORE THROAT, COUGHING, SHORTNESS OF BREATH,
VOMITING, DIARRHEA, TREMBLING, FAINTNESS, AND PARALYSIS OF THE ARMS AND
LEGS. BARIUM AND ITS SOLUBLE COMPOUNDS MAY ALSO CAUSE DYSPNEA, WEAKNESS,
ANXIETY, CARDIAC IRREGULARITY AND OTHER MUSCLE STIMULATION EFFECTS, AND
CONVULSIONS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING
HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST.
TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

BARIUM:

IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

BARIUM:

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS, AND PAIN.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

BARIUM:

ACUTE EXPOSURE- BARIUM AND SOLUBLE BARIUM COMPOUNDS MAY CAUSE SALIVATION, VOMITING, SEVERE DIARRHEA WITH WATERY AND BLOODY STOOLS, COLIC, GASTROENTERITIS, WEAKNESS, GIDDINESS, ANXIETY, TINNITIS, VERTIGO, CONFUSION, AND INCREASING SOMNOLENCE WITHOUT COMA, DYSPNEA, SLOW PULSE, HYPOKALEMIA, DELAYED KIDNEY DAMAGE, AND AT HIGH LEVELS, HEMOLYSIS AND HEMORRHAGES IN THE STOMACH, INTESTINES AND KIDNEYS MAY OCCUR. STIMULATION OF ALL MUSCLE TYPES MAY RESULT IN HYPERPERISTALSIS, BLADDER CONTRACTION, LUMBAR PAIN, MUSCLE TWITCHING PROGRESSING TO CONVULSIONS AND/OR PARALYSIS, VASOCONSTRICTION, AND IRREGULAR CONTRACTION OF THE HEART FOLLOWED BY ARREST IN SYSTOLE. DEATH MAY OCCUR FROM CARDIAC OR RESPIRATORY FAILURE. CHRONIC EXPOSURE- NO EFFECTS HAVE BEEN REPORTED IN HUMANS. ANIMAL STUDIES HAVE SHOWN EFFECTS ON THE HEMOPOIETIC AND CENTRAL NERVOUS SYSTEMS.

FIRST AID- INDUCE VOMITING IMMEDIATELY WHEN SOLUBLE BARIUM COMPOUNDS ARE INGESTED. TREAT SUPPORTIVELY AND SYMPTOMATICALLY (PARMEGGIANI, ENCYCLOPEDIA OF OCCUPATIONAL HEALTH AND SAFETY, 3RD EDITION). GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

POISONING FROM BARIUM COMPOUNDS:

GIVE 30 GRAMS OF SODIUM SULFATE IN 250 ML OF WATER ORALLY AND REPEAT IN ONE HOUR. GIVE BY GASTRIC TUBE IF SYMPTOMS HAVE APPEARED. THE ADMINISTRATION OF SULFATE SALTS INTRAVENOUSLY IS HAZARDOUS, SINCE THEY INDUCE THE PRECIPITATION OF BARIUM SULFATE IN THE KIDNEY, WITH SUBSEQUENT RENAL FAILURE. ADMINISTRATION OF POTASSIUM IS CRITICAL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

BARIUM METAL:

REACTS EXOTHERMICALLY ON CONTACT WITH WATER RELEASING FLAMMABLE HYDROGEN GAS WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION.

INCOMPATIBILITIES:

BARIUM:

ACIDS: VIOLENT REACTION.

AMMONIA: INCOMPATIBLE.

BROMINE PENTAFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

CARBON TETRACHLORIDE: VIOLENT REACTION OR POSSIBLE EXPLOSION.

FLUOROTRICHLOROMETHANE: FORMS AN EXPLOSIVE MIXTURE.

IODINE HEPTAFLUORIDE: EXOTHERMIC REACTION.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

TETRACHLOROETHYLENE: FORMS AN EXPLOSIVE MIXTURE.

TRICHLOROETHYLENE: FORMS AN EXPLOSIVE MIXTURE.

TRICHLOROTRIFLUOROETHANE: FORMS AN EXPLOSIVE MIXTURE.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE CORROSIVE FUMES OF OXIDES OF BARIUM.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBERS, D001 AND D003. 100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

BARIUM - REGULATORY LEVEL: 100.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D005.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:
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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

BARIUM, SOLUBLE COMPOUNDS (AS BA):

5 MG/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND
QUARTER-MASK RESPIRATORS.
ANY SUPPLIED AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

12.5 MG/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST
FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW
MODE.

25 MG/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING
FACEPIECE AND A HIGH EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE

OPERATED IN A CONTINUOUS FLOW MODE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

250 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED
IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING
APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT
EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY
BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH
FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 03/19/85 REVISION DATE: 02/25/92

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BARIUM CHLORIDE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS02370

CAS#: 10361-37-2 FORMULA: BaCl₂

BARIUM CHLORIDE IS AN ODORLESS WHITE SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATIONS OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE DROOLING, COUGHING, BLURRED VISION, METAL TASTE IN THE MOUTH, DIFFICULTY BREATHING, STOMACH PAIN, NAUSEA, VOMITING, DIARRHEA, DRUNKENNESS, HEART ATTACK, KIDNEY FAILURE, PARALYSIS, AND POSSIBLE DEATH.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS02370

10361-37-2

BARIUM CHLORIDE

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OHS02370

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: BARIUM CHLORIDE

CAS NUMBER: 10361-37-2
RTECS NUMBER: CQ8750000

TRADE NAMES/SYNONYMS:

BARIUM CHLORIDE (BaCl₂); BARIUM DICHLORIDE; BARIUM CHLORIDE, ANHYDROUS;
BA 0108E; BaCl₂; OHS02370

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: Ba-Cl₂

MOLECULAR WEIGHT: 208.25

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: BARIUM CHLORIDE
CAS# 10361-37-2

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

BARIUM, SOLUBLE COMPOUNDS (AS BA):

0.5 MG/M3 OSHA TWA
0.5 MG/M3 ACGIH TWA
0.5 MG/M3 NIOSH RECOMMENDED TWA
0.5 MG/M3 DFG MAK TWA (TOTAL DUST);
1.0 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; WATER; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7056).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: ODORLESS WHITE CRYSTALS WITH A BITTER, SALTY TASTE.

BOILING POINT: 2840 F (1560 C) MELTING POINT: 1765 F (963 C)

SPECIFIC GRAVITY: 3.917 VAPOR PRESSURE: <0.1 MMHG @ 20 C

SOLUBILITY IN WATER: 59% @ 100 C

SOLVENT SOLUBILITY: SOLUBLE IN METHANOL, SLIGHTLY SOLUBLE IN HYDROCHLORIC ACID, NITRIC ACID, ALMOST INSOLUBLE IN ETHANOL, ACETONE, ETHYL ACETATE.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
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 (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 55).

MOVE CONTAINER FROM AREA IF POSSIBLE. FIGHT FIRE FROM MAXIMUM SAFE DISTANCE.

TOXICITY

BARIUM CHLORIDE:

TOXICITY DATA:

ANHYDROUS: 11,400 UG/KG ORAL-HUMAN LDLO; 118 MG/KG ORAL-RAT LD50; 70 MG/KG ORAL-MOUSE LDLO; 170 MG/KG ORAL-RABBIT LDLO; 76 MG/KG ORAL-GUINEA PIG LD50; 90 MG/KG ORAL-DOG LDLO; 178 MG/KG SUBCUTANEOUS-RAT LD50; 10 MG/KG SUBCUTANEOUS-MOUSE LDLO; 40 MG/KG SUBCUTANEOUS-RABBIT LDLO; 55 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 18 MG/KG SUBCUTANEOUS-CAT LDLO; 20 MG/KG INTRAVENOUS-RAT LDLO; 12 MG/KG INTRAVENOUS-MOUSE LD50; 15 MG/KG INTRAVENOUS-RABBIT LDLO; 20 MG/KG PARENTERAL-RABBIT LDLO; 10 MG/KG SUBCUTANEOUS-DOG LDLO; 40 MG/KG INTRAVENOUS-CAT LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

DIHYDRATE: 51 MG/KG INTRAPERITONEAL-MOUSE LD50.

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.

ACUTE TOXICITY LEVEL: TOXIC BY INGESTION.

TARGET EFFECTS: POISONING MAY AFFECT THE KIDNEYS, CARDIOVASCULAR AND CENTRAL

NERVOUS SYSTEMS.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH CHRONIC RESPIRATORY,
CARDIOVASCULAR OR SKIN DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

BARIUM CHLORIDE:

IRRITANT. 250 MG(BA)/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT WITH SORE THROAT, COUGHING AND LABORED BREATHING. IF SUFFICIENT AMOUNTS ARE ABSORBED, SYMPTOMS MAY RESEMBLE THOSE IN ACUTE INGESTION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

BARIUM CHLORIDE:

IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION AND DERMATITIS. IF SUFFICIENT AMOUNTS ARE ABSORBED, EFFECTS MAY OCCUR AS IN ACUTE INGESTION.

CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT WITH IRRITANTS MAY CAUSE DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

BARIUM CHLORIDE:

IRRITANT.

ACUTE EXPOSURE- APPLICATION OF AN 0.08 TO 0.01 M SOLUTION, FOR TEN MINUTES, ON RABBIT EYES, AFTER THE CORNEAL EPITHELIUM WAS REMOVED, RESULTED IN NO OPACIFICATION. HOWEVER, IT DID CAUSE CONSIDERABLE IRITIS, WHICH SUBSIDED IN A FEW DAYS.

CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT WITH IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

BARIUM CHLORIDE:

TOXIC.

ACUTE EXPOSURE- THE FATAL DOSE FOR MAN IS REPORTED TO BE BETWEEN 0.8 AND 0.9 GRAMS. THE INITIAL EFFECTS FROM SOLUBLE BARIUM COMPOUNDS ARE THOSE OF SEVERE GASTROINTESTINAL IRRITATION, INCLUDING NAUSEA, VOMITING AND DIARRHEA WITH OR WITHOUT ABDOMINAL COLIC, AND EXCESSIVE SALIVATION. THERE

MAY ALSO BE DRYNESS AND A SENSE OF CONSTRICTION OF THE MOUTH AND THROAT AND A METALLIC TASTE. SYSTEMIC EFFECTS FOLLOW AND MAY INCLUDE OCULAR CHANGES, CAUSING BLURRED VISION. HYPOKALEMIA MAY OCCUR AND RESULT IN ABNORMALITIES OF MYOCARDIAL FUNCTION AND IMPAIRED NEUROMUSCULAR FUNCTION, WHICH MAY VARY FROM MINIMAL WEAKNESS TO FRANK PARALYSIS. OTHER EFFECTS MAY INCLUDE ANXIETY, WEAKNESS, AND GRADUALLY INCREASING SLEEPINESS WITH MENTAL CONFUSION. THE CENTRAL NERVOUS SYSTEM MAY BE FIRST STIMULATED AND THEN DEPRESSED. HEMORRHAGES MAY OCCUR IN THE STOMACH, INTESTINES AND KIDNEYS. KIDNEY DAMAGE AND KIDNEY FAILURE HAVE BEEN DESCRIBED. COLLAPSE AND DEATH FROM RESPIRATORY FAILURE, SEVERE HYPOKALEMIA AND CARDIAC ARREST MAY OCCUR. CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- INDUCE VOMITING IMMEDIATELY WHEN SOLUBLE BARIUM COMPOUNDS ARE INGESTED. TREAT SUPPORTIVELY AND SYMPTOMATICALLY (PARMEGGIANI, ENCYCLOPEDIA OF OCCUPATIONAL HEALTH AND SAFETY, 3RD EDITION). GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

POISONING FROM BARIUM COMPOUNDS:

GIVE 30 GRAMS OF SODIUM SULFATE IN 250 ML OF WATER ORALLY AND REPEAT IN ONE HOUR. GIVE BY GASTRIC TUBE IF SYMPTOMS HAVE APPEARED. THE ADMINISTRATION OF SULFATE SALTS INTRAVENOUSLY IS HAZARDOUS, SINCE THEY INDUCE THE PRECIPITATION OF BARIUM SULFATE IN THE KIDNEY, WITH SUBSEQUENT RENAL FAILURE. ADMINISTRATION OF POTASSIUM IS CRITICAL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

BARIUM CHLORIDE:

BROMINE TRIFLUORIDE: RAPIDLY ATTACKS BARIUM CHLORIDE; VIOLENT REACTION.

COMBUSTIBLE MATERIAL: VIOLENT REACTION.

2-FURAN PERCARBOXYLIC ACID: EXPLOSIVE REACTION.

ORGANIC MATTER: VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND HAZARDOUS OXIDES OF BARIUM, AND CORROSIVE HYDROCHLORIC ACID.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

BARIUM - REGULATORY LEVEL: 100.0 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D005.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINERS AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

BARIUM, SOLUBLE COMPOUNDS (AS BA):

5 MG/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND
QUARTER-MASK RESPIRATORS.
ANY SUPPLIED AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

12.5 MG/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST
FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW
MODE.

25 MG/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING
FACEPIECE AND A HIGH EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE
OPERATED IN A CONTINUOUS FLOW MODE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

250 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED
IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING
APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT
EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY
BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH
FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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BISMUTH MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS03180

CAS#: 7440-69-9 FORMULA: BI

BISMUTH IS AN ODORLESS, SILVER-WHITE OR REDDISH METAL.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: NO INFORMATION AVAILABLE ON SIGNIFICANT ADVERSE EFFECTS.

LONG TERM EXPOSURE: MAY CAUSE DROOLING, BAD BREATH, HEADACHE, FEVER, NAUSEA, STOMACH PAIN, VOMITING, DIARRHEA, REDNESS AND SWELLING OF THE SKIN, GUM DISEASE, AND KIDNEY AND LIVER DAMAGE WITH YELLOWING OF THE SKIN AND EYES.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS03180

7440-69-9

BISMUTH

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OHS03180

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-69-9
RTECS NUMBER: EB2600000

SUBSTANCE: BISMUTH

TRADE NAMES/SYNONYMS:
BISMUTH ELEMENT; BI; OHS03180

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: BI

MOLECULAR WEIGHT: 208.98

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: BISMUTH
CAS# 7440-69-9

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: ODORLESS, SILVER-WHITE OR REDDISH METAL.

BOILING POINT: 2840 F (1560 C) MELTING POINT: 520 F (271 C)

SPECIFIC GRAVITY: 9.80 VAPOR PRESSURE: 1 MMHG @ 1021 C

SOLUBILITY IN WATER: INSOLUBLE

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLECTIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

BISMUTH:

TOXICITY DATA: 5 GM/KG ORAL-RAT LD50; 10 GM/KG ORAL-MOUSE LD50; 221 MG/KG UNREPORTED-MAN LDLO.

CARCINOGEN STATUS: NONE.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION.

TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

BISMUTH:

ACUTE EXPOSURE- BISMUTH COMPOUNDS HAVE LITTLE OR NO EFFECT ON INTACT MUCOUS MEMBRANES.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

BISMUTH:

ACUTE EXPOSURE- BISMUTH COMPOUNDS HAVE LITTLE OR NO EFFECT ON INTACT SKIN.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

BISMUTH:

ACUTE EXPOSURE- DIRECT CONTACT WITH BISMUTH COMPOUNDS IS NOT EXPECTED TO CAUSE INJURY EXCEPT IN THE CASE OF STRONGLY ACIDIC SALTS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

BISMUTH:

ACUTE EXPOSURE- NO DATA AVAILABLE.
CHRONIC EXPOSURE- NO SPECIFIC DATA AVAILABLE. REPEATED OR PROLONGED INGESTION OF SOLUBLE BISMUTH COMPOUNDS MAY CAUSE DECREASED APPETITE, COLIC, NAUSEA, VOMITING, DIARRHEA, ULCERATIVE STOMATITIS, FOUL BREATH, SALIVATION, GINGIVITIS, A BLUE-GRAY BISMUTH LINE ON THE GUMS OR A DIFFUSE OR PATCHY BLuish COLOR OF THE MUCOSA, WEAKNESS, RHEUMATIC PAIN, FEVER, HEADACHE, AND SKIN RASHES OR LESIONS FOLLOWED BY EXFOLIATIVE DERMATITIS. NEPHRITIS AND DIURESIS MAY BE MANIFESTATIONS OF KIDNEY DAMAGE. LIVER DAMAGE WITH MILD JAUNDICE AND CONJUNCTIVAL HEMORRHAGE ARE RARE. A REVERSIBLE ENCEPHALOPATHY AND OSTEODYSTROPHY HAVE BEEN REPORTED FROM BISMUTH SALTS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

BISMUTH:

ACIDS: POSSIBLE EXOTHERMIC REACTION WITH RELEASE OF TOXIC FUMES.
ALUMINUM: MAY FORM PYROPHORIC MIXTURE.
AMMONIUM NITRATE: EXPLOSIVE REACTION.
BROMINE PENTAFLUORIDE: INCANDESCENT REACTION.
CHLORIC ACID: FORMS EXPLOSIVE COMPOUND.
CHLORINE (GAS): SPONTANEOUS IGNITION.
IODINE PENTAFLUORIDE: INCANDESCENT REACTION.
NITRIC ACID (CONCENTRATED): MAY EXPLODE AT ELEVATED TEMPERATURES.
NITROSYL FLUORIDE: INCANDESCENT REACTION.
OXIDIZERS: FIRE AND EXPLOSION HAZARD.
PERCHLORIC ACID: EXPLOSION HAZARD.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

PREVENT DISPERSION OF DUST IN AIR.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

PROTECTIVE CLOTHING NOT REQUIRED. AVOID REPEATED OR PROLONGED CONTACT WITH THIS SUBSTANCE.

GLOVES:

PROTECTIVE GLOVES ARE NOT REQUIRED BUT RECOMMENDED.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY

BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH
FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/03/84 REVISION DATE: 12/03/91

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CADMIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS03720

CAS#: 7440-43-9 FORMULA: CD

CADMIUM IS AN ODORLESS SILVER METAL OR POWDER.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. DUST-AIR MIXTURES MAY CATCH FIRE OR EXPLODE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST OR FUMES OF CADMIUM MAY CAUSE IRRITATION OF THE NOSE, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE RUNNY NOSE, METALLIC TASTE, DIZZINESS, CHOKING, DIFFICULTY BREATHING, WHEEZING, DROOLING, CHEST PAIN, WEAKNESS, HEADACHE, FEVER, SHIVERING, SWEATING, NAUSEA, VOMITING, DIARRHEA, MUSCLE PAIN, LUNG CONGESTION, LIVER AND KIDNEY DAMAGE, AND POSSIBLE DEATH.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES AND LUNG INJURY MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS03720
7440-43-9
CADMIUM

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OHS03720

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-43-9
RTECS NUMBER: EU9800000

SUBSTANCE: CADMIUM

TRADE NAMES/SYNONYMS:
CADMIUM ELEMENT; C.I. 77180; CD; OHS03720

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: CD

MOLECULAR WEIGHT: 112.41

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: CADMIUM
CAS# 7440-43-9

PERCENT: 100.0

EXPOSURE LIMITS:
CADMIUM:

* OSHA EXPOSURE LIMIT REMOVED AS PER OSHA INSTRUCTION PUB 8-1.4A
0.05 MG(CD)/M3 ACGIH TWA (DUST, SALTS)
(NOTICE OF INTENDED CHANGES 1990-91)
0.05 MG(CD)/M3 ACGIH CEILING LIMIT (CADMIUM OXIDE FUME)
(NOTICE OF INTENDED CHANGES 1990-91)
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7048).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (OCTOBER 1, 1987)

CADMIUM:
10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: SOFT, DUCTILE, MALLEABLE SILVER-WHITE, LUSTROUS METAL OR POWDER.

BOILING POINT: 1409 F (765 C) MELTING POINT: 610 F (321 C)

SPECIFIC GRAVITY: 8.642 VAPOR PRESSURE: 1 MMHG @ 394 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN ACIDS, AMMONIUM NITRATE SOLUTIONS, HOT SULFURIC AND HYDROCHLORIC ACIDS.

AUTOIGNITION TEMP: 482 F (250 C) (LAYER), 1058 F (570 C) (CLOUD)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

SLIGHT FIRE HAZARD IN METALLIC FORM. THE FINELY DIVIDED METAL MAY BE PYROPHORIC IN AIR. DUST-AIR MIXTURES MAY BE EXPLOSIVE.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
POISON B

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:
POISON

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.365
EXCEPTIONS: 49 CFR 173.364

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
*FLAMMABLE SOLID AND POISON

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
CADMIUM COMPOUNDS-UN 2570

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG I

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.211
BULK PACKAGING: 49 CFR 173.244

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 KG
CARGO AIRCRAFT ONLY: 50 KG

TOXICITY

CADMIUM:

TOXICITY DATA: 88 UG/M3/8.6 YEARS INHALATION-MAN TCLO; 39 MG/M3/20 MINUTES
INHALATION-HUMAN LCLO; 15 MG/KG UNREPORTED-MAN LDLO; 225 MG/KG ORAL-RAT
LD50; 25 MG/M3/30 MINUTES INHALATION-RAT LC50; 890 MG/KG ORAL-MOUSE LD50;
170 MG/M3 INHALATION-MOUSE LCLO; 70 MG/KG ORAL-RABBIT LDLO; 4 MG/KG
INTRAPERITONEAL-RAT LD50; 9 MG/KG SUBCUTANEOUS-RAT LD50; 6 MG/KG
SUBCUTANEOUS-RABBIT LDLO; 1800 UG/KG INTRAVENOUS-RAT LD50; 1140 MG/KG
UNREPORTED-RAT LD50; 5 MG/KG INTRAVENOUS-RABBIT LDLO; MUTAGENIC DATA

(RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS). CARCINOGEN STATUS: ANTICIPATED HUMAN CARCINOGEN (NTP); HUMAN LIMITED EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2A). CADMIUM HAS PRODUCED LOCAL SARCOMAS IN RATS FOLLOWING INTRAMUSCULAR ADMINISTRATION. EXPOSURE TO CADMIUM, PRIMARILY AS THE OXIDE, HAS BEEN ASSOCIATED WITH INCREASED RISKS OF PROSTATIC AND RESPIRATORY CANCERS.

LOCAL EFFECTS: IRRITANT- INHALATION.

ACUTE TOXICITY LEVEL: HIGHLY TOXIC BY INHALATION; TOXIC BY INGESTION.

TARGET EFFECTS: NEPHROTOXIN. POISONING MAY AFFECT THE LIVER, BONE, BLOOD, LUNGS, AND THE NERVOUS SYSTEM.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH KIDNEY OR RESPIRATORY DISORDERS.

ADDITIONAL DATA: DEFICIENCIES IN IRON, CALCIUM, ZINC, PROTEIN AND VITAMINS C AND D MAY ENHANCE THE TOXIC EFFECTS. ALTERATIONS OF DRUG METABOLIZING ACTIVITY HAVE BEEN INDUCED IN ANIMALS. SMOKING MAY RESULT IN HIGHER BLOOD CADMIUM LEVELS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

CADMIUM:

IRRITANT/NEPHROTOXIN/HIGHLY TOXIC.

ACUTE EXPOSURE- THE AVERAGE CONCENTRATION OF FUME RESPONSIBLE FOR FATALITIES IS 40-50 MG/M3 FOR 1 HOUR OR 9 MG/M3 FOR 5 HOURS. EARLY SYMPTOMS MAY INCLUDE MILD IRRITATION OF THE UPPER RESPIRATORY TRACT, RHINITIS, VERTIGO, A SENSATION OF CONSTRICTION OF THE THROAT, A METALLIC TASTE IN THE MOUTH AND COUGH. A LATENT PERIOD FROM 1-10 HOURS MAY PRECEDE THE ONSET OF RAPIDLY PROGRESSING DYSPNEA, CYANOSIS, SUBSTERNAL OR PRECORDIAL CHEST PAIN, AND A FLU-LIKE SYNDROME WITH WEAKNESS, MALAISE, NAUSEA, VOMITING, HEADACHE, FEVER, CHILLS, SHIVERING, PROFUSE SWEATING, AND MUSCULAR PAINS IN THE BACK AND LIMBS. COUGH WITH FOAMY OR BLOODY SPUTUM AND PULMONARY RALES MARK THE ONSET OF ACUTE PULMONARY EDEMA WHICH USUALLY DEVELOPS WITHIN 24 HOURS AND REACHES A MAXIMUM BY 3 DAYS. IF DEATH FROM ASPHYXIA DOES NOT OCCUR, AND EXPOSURE WAS MILD, SYMPTOMS MAY RESOLVE WITHIN A WEEK. IN MORE SEVERE EXPOSURES, ALL SYMPTOMS INCLUDING PROLIFERATIVE INTERSTITIAL PNEUMONITIS MAY PERSIST FROM 3-10 DAYS. PERMANENT PULMONARY FIBROSIS AND HYPERTROPHY OF BRONCHIAL VESSELS MAY OCCUR. THE FATALITY RATE HAS BEEN ESTIMATED TO BE BETWEEN 15-20%. ACUTE RENAL NECROSIS AND/OR LIVER DAMAGE MAY DEVELOP FOLLOWING MASSIVE ACUTE EXPOSURE. SEQUELAE FROM NON-FATAL EXPOSURE MAY INCLUDE MICROCYTIC, HYPOCHROMIC ANEMIA, TESTICULAR ATROPHY, CARDIOVASCULAR EFFECTS, EMPHYSEMA, ANEMIA AND OSTEOMALACIA.

CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE. REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRREVERSIBLE LUNG INJURY OF THE EMPHYSEMATOUS TYPE WITH COUGH AND SHORTNESS OF BREATH, ABNORMAL LUNG FUNCTION, AIRWAYS OBSTRUCTION AND POSSIBLY PULMONARY FIBROSIS. ULCERATION OF THE NASAL SEPTUM AND YELLOW DISCOLORATION OF THE TEETH MAY OCCUR. CADMIUM INDUCED KIDNEY DAMAGE IS IRREVERSIBLE AND MAY PROGRESS AFTER EXPOSURE CEASES. PROTEINURIA MAY BE THE FIRST SIGN OF DAMAGE AND MAY BE ASSOCIATED WITH GLUCOSURIA, AMINOACIDURIA, IMPAIRED EXCRETION, DECREASED CONCENTRATING CAPACITY, INCREASED EXCRETION OF CALCIUM AND PHOSPHORUS, AND INCREASED PLASMA CREATININE. CALCIURIA MAY FAVOR THE DEVELOPMENT OF KIDNEY STONES. SOME CASES OF KIDNEY FAILURE HAVE BEEN REPORTED. OSTEOMALACIA, OSTEOPOROSIS, AND SPONTANEOUS FRACTURES MAY OCCUR AND MAY BE MANIFESTED AS BACK PAIN, PAIN IN THE EXTREMITIES, DIFFICULTY IN WALKING, AND PAIN

ON BONE PRESSURE. OTHER SYMPTOMS MAY INCLUDE DAMAGE TO THE OLFACTORY NERVE AND ANOSMIA, HEMOLYTIC AND IRON-DEFICIENCY ANEMIA, WEIGHT LOSS, AND IRRITABILITY. SOME STUDIES SUGGEST A RELATIONSHIP BETWEEN CADMIUM LEVELS IN AIR AND HUMAN CARDIOVASCULAR DISEASE AND HYPERTENSION, BUT CAUSAL ASSOCIATION HAS NOT BEEN PROVEN. LONG-TERM SEQUELAE MAY INCLUDE RENAL TUBULAR NECROSIS, CARDIOVASCULAR EFFECTS, AND LIVER DAMAGE. OCCUPATIONAL EXPOSURE TO CADMIUM IS IMPLICATED IN A SIGNIFICANT INCREASE IN THE INCIDENCE OF PROSTATIC AND RESPIRATORY CANCERS. ONE STUDY ALSO REPORTS A SIGNIFICANT INCREASE IN RENAL CANCERS IN THOSE WITH INFERRED OCCUPATIONAL EXPOSURE TO CADMIUM. THERE IS ALSO LIMITED INFORMATION SUGGESTING THAT CADMIUM MAY INTERFERE WITH SPERM PRODUCTION IN HUMANS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

CADMIUM:

ACUTE EXPOSURE- DIRECT CONTACT MAY RESULT IN IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY RESULT IN DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

CADMIUM:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS, PAIN AND SMARTING, BUT NO INJURY HAS BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

CADMIUM:

NEPHROTOXIN/TOXIC.

ACUTE EXPOSURE- CADMIUM IS A POWERFUL EMETIC WHICH INDUCES VOMITING SO THAT LESS IS RETAINED AND ABSORBED. IF SUFFICIENT AMOUNTS ARE ABSORBED SYSTEMIC TOXICITY MAY OCCUR. SYMPTOMS, WHICH MAY BEGIN WITHIN 1-60 MINUTES AFTER INGESTION, ARE SALIVATION, CHOKING, SEVERE NAUSEA, PERSISTENT VOMITING, DIARRHEA, TENESMUS, ABDOMINAL PAIN, BLURRED VISION, DIZZINESS, VERTIGO, HEADACHE, MUSCULAR CRAMPS AND RARELY, CONVULSIONS, EXHAUSTION, COLLAPSE, SHOCK AND UNCONSCIOUSNESS. IF DEATH OCCURS, IT IS USUALLY WITHIN 24 HOURS FROM SHOCK DUE TO FLUID LOSS, OR, IT MAY BE DELAYED 7-14 DAYS AND RESULT FROM ACUTE RENAL FAILURE OR CARDIOPULMONARY DEPRESSION. IF VICTIM SURVIVES, DELAYED LIVER AND/OR KIDNEY DAMAGE MAY OCCUR. A DOSE EXCEEDING 300 MG MAY BE FATAL.

CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE. PROLONGED LOW LEVEL EXPOSURE MAY CAUSE IRREVERSIBLE RENAL TUBULAR DYSFUNCTION AS DESCRIBED IN CHRONIC INHALATION. ANIMAL EXPERIMENTS INDICATE ANTAGONISTIC ACTIVITY BETWEEN CADMIUM AND ZINC SUCH THAT ABNORMAL ZINC METABOLISM WAS FOUND TO CONTRIBUTE SIGNIFICANTLY TO THE TOXIC SYNDROME FOLLOWING PROLONGED INGESTION OF CADMIUM. FUNCTIONAL CHANGES IN THE LIVER, PANCREAS AND ADRENAL GLANDS WHICH ALTER GLUCOSE METABOLISM MAY OCCUR. ALTHOUGH INCONCLUSIVE, SOME STUDIES SUGGEST A RELATIONSHIP BETWEEN PROLONGED EXPOSURE TO CADMIUM AND HUMAN CARDIOVASCULAR DISEASE AND HYPERTENSION. A STUDY WHICH SUPPORTS THIS THEORY WAS REPORTED WHERE FEMALE RATS EXHIBITED HYPERTENSION AFTER CHRONICALLY INGESTING CADMIUM THROUGH THEIR DRINKING WATER. REPRODUCTIVE EFFECTS SUCH AS CONGENITAL ABNORMALITIES, INCREASED MORTALITY, AND REDUCED RATES OF GROWTH HAVE BEEN FOUND IN ANIMALS AFTER PROLONGED INGESTION OF CADMIUM.

FIRST AID- GIVE MILK OR BEATEN EGGS EVERY 4 HOURS TO RELIEVE GASTROINTESTINAL IRRITATION. REMOVE UNABSORBED CADMIUM BY CATHARSIS WITH FLEET'S PHOSPHO-SODA, 30-60 ML DILUTED 1:4 IN WATER (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREATMENT MUST BE ADMINISTERED MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

CADMIUM POISONING:

DO NOT GIVE DIMERCAPROL (BAL). IF SYMPTOMS PERSIST, THE ADMINISTRATION OF CALCIUM DISODIUM EDETATE IS RECOMMENDED. GIVE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD, TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.

FOR INTRAMUSCULAR ADMINISTRATION, GIVE 20% SOLUTION (200 MG/ML), 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

CADMIUM:

AMMONIUM NITRATE (FUSED): VIOLENT OR EXPLOSIVE REACTION.

HYDRAZOIC ACID: MAY EXPLODE VIOLENTLY.

NITRYL FLUORIDE: INCANDESCENT REACTION WHEN HEATED SLIGHTLY.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

SELENIUM: EXOTHERMIC REACTION.

SULFUR: FIRE AND EXPLOSION HAZARD.
TELLURIUM: INCANDESCENT REACTION IN HYDROGEN ATMOSPHERE.
ZINC: INTENSE EXOTHERMIC REACTION.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CADMIUM.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

CADMIUM - REGULATORY LEVEL: 1.0 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D006.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

WATER SPILL:
THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:
FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

REPORTABLE QUANTITY (RQ): 10 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES

THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROCESS ENCLOSURE VENTILATION RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CADMIUM DUST AND FUME (AS CD):

AT ANY DETECTABLE CONCENTRATION:

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.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/03/84 REVISION DATE: 02/25/92

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CADMIUM CHLORIDE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS03740

CAS#: 10108-64-2 FORMULA: CdCl_2

CADMIUM CHLORIDE IS AN ODORLESS, COLORLESS OR WHITE SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE COUGHING, DIZZINESS, COLDNESS, FAINTING, BLUISH COLOR TO THE SKIN, LIPS, AND FINGERNAILS, DROOLING, HEADACHE, CHOKING, NAUSEA, VOMITING, DIARRHEA, CHEST PAIN, STOMACH PAIN, BLURRED VISION, UNCONSCIOUSNESS, LUNG CONGESTION, AND LUNG, KIDNEY AND LIVER DAMAGE. MAY CAUSE DEATH BY INHALATION.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING TO THE SKIN AND EYES, BLOOD AND BONE CHANGES, AND NOSE DAMAGE MAY OCCUR. MAY CAUSE CANCER.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS03740

10108-64-2

CADMIUM CHLORIDE

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OHS03740

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 10108-64-2
RTECS NUMBER: EV0175000

SUBSTANCE: CADMIUM CHLORIDE

TRADE NAMES/SYNONYMS:

CADMIUM DICHLORIDE; DICHLOROCADMIUM; STCC 4952505; CADMIUM CHLORIDE (CDCL₂);
CDCL₂; OHS03740

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: CD-CL₂

MOLECULAR WEIGHT: 183.32

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: CADMIUM CHLORIDE
CAS# 10108-64-2

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

CADMIUM:

* OSHA EXPOSURE LIMIT REMOVED AS PER OSHA INSTRUCTION PUB 8-1.4A
0.05 MG(CD)/M3 ACGIH TWA (DUST, SALTS)
(NOTICE OF INTENDED CHANGES 1990-91)
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7048).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (OCTOBER 1, 1987)

CADMIUM CHLORIDE:

10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS OR WHITE, HYGROSCOPIC, HEXAGONAL, CRYSTALLINE SOLID. BOILING POINT: 1760 F (960 C) MELTING POINT: 1054 F (568 C)
SPECIFIC GRAVITY: 4.047 @ 25 C VAPOR PRESSURE: 10 MMHG @ 656 C
SOLUBILITY IN WATER: 140% @ 20 C
SOLVENT SOLUBILITY: SOLUBLE IN ACETONE; SLIGHTLY SOLUBLE IN ETHANOL, METHANOL; INSOLUBLE IN ETHER.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 53).

EXTINGUISH USING AGENTS SUITABLE FOR TYPE OF FIRE. AVOID BREATHING POISONOUS VAPORS, KEEP UPWIND.

TOXICITY

CADMIUM CHLORIDE:
TOXICITY DATA:

ANHYDROUS: 3 GM/KG ORAL-WOMAN LDLO; 88 MG/KG ORAL-RAT LD50; 60 MG/KG ORAL-MOUSE LD50; 70 MG/KG ORAL-RABBIT LDLO; 63 MG/KG ORAL-GUINEA PIG LD50; 233 MG/KG SKIN-GUINEA PIG LDLO; 420 MG/M3/30 MINUTES INHALATION-DOG LC90; 2300 MG/M3 INHALATION-MOUSE LC50; 6 MG/KG SUBCUTANEOUS-RAT LDLO; 3200 UG/KG SUBCUTANEOUS-MOUSE LD50; 18 MG/KG SUBCUTANEOUS-RABBIT LDLO; 25 MG/KG SUBCUTANEOUS-CAT LDLO; 7500 UG/KG SUBCUTANEOUS-GERBIL LDLO; 5 MG/KG INTRAVENOUS-CAT LDLO; 5 MG/KG INTRAVENOUS-DOG LDLO; 3500 UG/KG INTRAVENOUS-MOUSE LD50; 2 MG/KG INTRAVENOUS-RABBIT LDLO; 1800 UG/KG INTRAPERITONEAL-RAT LD50; 9300 UG/KG INTRAPERITONEAL-MOUSE LD50; 233 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; 88 MG/KG UNREPORTED-MAMMAL LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

MONOHYDRATE: REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
 DIHYDRATE: REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
 HYDRATE (2:5): 194 MG/KG ORAL-MOUSE LD50; 4567 UG/KG INTRAPERITONEAL-MOUSE LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
 CARCINOGEN STATUS: ANTICIPATED HUMAN CARCINOGEN (NTP); HUMAN LIMITED EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2A). MALE RATS EXPOSED CONTINUOUSLY TO CADMIUM CHLORIDE AEROSOLS DEVELOPED A DOSE-RELATED INCREASE IN LUNG CANCERS. TESTICULAR ATROPHY FOLLOWED BY TESTICULAR TUMORS OCCURRED IN RATS AND MICE AND LOCAL SARCOMAS OCCURRED IN RATS FOLLOWING SUBCUTANEOUS ADMINISTRATION. STUDIES HAVE SUGGESTED THAT HUMAN EXPOSURE TO CADMIUM IN SOME FORM (PRIMARILY THE OXIDE) IS ASSOCIATED WITH INCREASED RISKS OF PROSTATIC AND RESPIRATORY CANCERS.
 LOCAL EFFECTS: IRRITANT- EYE, SKIN, MUCOUS MEMBRANES.
 ACUTE TOXICITY LEVEL: TOXIC BY INHALATION AND INGESTION.
 TARGET EFFECTS: POISONING MAY AFFECT THE KIDNEYS, BONE, BLOOD AND LIVER, AND THE RESPIRATORY, NERVOUS, CARDIOVASCULAR AND GASTROINTESTINAL SYSTEMS.
 AT INCREASED RISK FROM EXPOSURE: PERSONS WITH KIDNEY, LIVER, OR RESPIRATORY DISORDERS.
 ADDITIONAL INFORMATION: NEITHER EYE NOR RESPIRATORY IRRITATION IS ENOUGH TO PREVENT EXPOSURE WHICH MAY CAUSE SERIOUS SYSTEMIC POISONING.

HEALTH EFFECTS AND FIRST AID

INHALATION:

CADMIUM CHLORIDE:

CARCINOGEN/TOXIC.

SEE INFORMATION ON CADMIUM COMPOUNDS. RATS EXPOSED TO CADMIUM CHLORIDE AEROSOLS BY INHALATION ALMOST CONTINUOUSLY FOR 18 MONTHS, AND OBSERVED FOR AN ADDITIONAL 13 MONTHS, DEVELOPED PRIMARY LUNG CARCINOMAS IN 71% OF THOSE EXPOSED TO 50 UG/M3, 52.6% EXPOSED TO 25 UG/M3, AND 15.4% EXPOSED TO 12.5 UG/M3. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

CADMIUM COMPOUNDS:

NEPHROTOXIN. 50 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- EXPOSURE TO SUFFICIENTLY HIGH CONCENTRATIONS OF CADMIUM DUSTS MAY RESULT IN UPPER RESPIRATORY TRACT IRRITATION WITH DELAYED SYMPTOMS OF COUGH, CHEST PAIN, DIZZINESS, ABDOMINAL PAIN, NAUSEA AND VOMITING. SEVERE EXPOSURES MAY RESULT IN LUNG, KIDNEY OR LIVER DAMAGE OR DEATH FROM MASSIVE PULMONARY EDEMA.

CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE AND RESPIRATORY EFFECTS FROM REPEATED OR PROLONGED EXPOSURE TO DUSTS OR FUMES MAY INCLUDE RHINITIS, BRONCHITIS, EMPHYSEMA, COUGH, DYSPNEA, ABNORMAL LUNG FUNCTION, OBSTRUCTIVE DISEASE, AND POSSIBLY FIBROSIS. ULCERATION OF THE NASAL SEPTUM AND YELLOW DISCOLORATION OF THE TEETH MAY OCCUR. CADMIUM INDUCED KIDNEY DAMAGE IS IRREVERSIBLE AND MAY PROGRESS AFTER EXPOSURE CEASES; SOME CASES OF PROGRESSION TO KIDNEY FAILURE HAVE BEEN DESCRIBED. PROTEINURIA IS USUALLY THE FIRST SIGN OF DAMAGE AND MAY BE ASSOCIATED WITH GLUCOSURIA, AMINOACIDURIA, DECREASED CONCENTRATING CAPACITY, INCREASED EXCRETION OF CALCIUM AND PHOSPHORUS, AND DECREASED CREATININE EXCRETION. CALCIIURIA MAY FAVOR THE DEVELOPMENT OF KIDNEY STONES. OSTEOMALACIA, OSTEOPOROSIS, AND SPONTANEOUS AND PSEUDOFRACTURES MAY OCCUR AND MAY BE MANIFESTED AS BACK PAIN, PAIN IN THE EXTREMITIES, DIFFICULTY IN WALKING, AND PAIN ON BONE PRESSURE. OTHER EFFECTS MAY INCLUDE IRRITABILITY, WEIGHT LOSS,

FATIGUE, MILD TO MODERATE ANEMIA, EOSINOPHILIA, DAMAGE TO THE OLFACTORY NERVE WITH ANOSMIA, AND LIVER DAMAGE. AN EPIDEMIOLOGICAL STUDY SUGGESTS A RELATIONSHIP BETWEEN CADMIUM LEVELS IN AIR AND CARDIOVASCULAR DISEASE, BUT A CAUSAL ASSOCIATION HAS NOT BEEN PROVED. OCCUPATIONAL EXPOSURE TO CADMIUM IS IMPLICATED IN A SIGNIFICANT INCREASE IN THE INCIDENCE OF PROSTATIC AND RESPIRATORY CANCERS. ONE STUDY ALSO REPORTS A SIGNIFICANT INCREASE IN RENAL CANCERS IN THOSE WITH INFERRED OCCUPATIONAL EXPOSURE TO CADMIUM.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

CADMIUM CHLORIDE:

IRRITANT.

ACUTE EXPOSURE- A 2% AQUEOUS SOLUTION WAS TESTED FOR SENSITIVITY ON 1502 PATIENTS, 25 (1.7%) HAD A REACTION WHICH INVESTIGATORS ATTRIBUTED TO AN IRRITANT EFFECT. SKIN ABSORPTION MAY OCCUR AND CAUSE CADMIUM POISONING AS DETAILED IN ACUTE INGESTION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY RESULT IN DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

CADMIUM CHLORIDE:

IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION. AQUEOUS SOLUTIONS APPLIED TO RABBIT EYES FOR 10 MINUTES AFTER MECHANICAL REMOVAL OF THE CORNEAL EPITHELIUM CAUSED TOTAL OPACIFICATION AND SCARRING OF THE CORNEA.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH IRRITANTS MAY RESULT IN CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

CADMIUM CHLORIDE:

TOXIC.

SEE INFORMATION ON CADMIUM COMPOUNDS. A INGESTION OF 150 GRAMS OF CADMIUM CHLORIDE PRODUCED FACIAL EDEMA, VOMITING, HYPOTENSION, RESPIRATORY ARREST, METABOLIC ACIDOSIS, PULMONARY EDEMA, OLIGURIA AND FINALLY DEATH 30 HOURS AFTER INGESTION. WHEN CADMIUM CHLORIDE WAS ADMINISTERED IN THE DRINKING WATER TO RATS FOR PROLONGED PERIODS, A 50% REDUCTION IN HEMOGLOBIN WAS FOUND. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

CADMIUM COMPOUNDS:

NEPHROTOXIN.

ACUTE EXPOSURE- THE PERSISTENT VOMITING INDUCED BY CADMIUM COMPOUNDS MAY LIMIT THE AMOUNT RETAINED, BUT IF SUFFICIENT AMOUNTS ARE ABSORBED, SYMPTOMS OF SYSTEMIC TOXICITY MAY BEGIN WITHIN 15 MINUTES TO 2 HOURS. SALIVATION, CHOKING, SEVERE NAUSEA, ABDOMINAL PAIN, DIARRHEA, TENESMUS, BLURRED VISION, DIZZINESS, HEADACHE, MUSCULAR CRAMPS, EXHAUSTION, COLLAPSE, SHOCK, UNCONSCIOUSNESS AND RARELY, CONVULSIONS MAY OCCUR. RECOVERY MAY BEGIN WITHIN 5-10 HOURS; SEQUELAE MAY INCLUDE DELAYED LIVER AND KIDNEY DAMAGE. SINGLE DOSES OF 10-20 MG OF SOLUBLE CADMIUM SALTS HAVE INDUCED SEVERE TOXIC EFFECTS AND DOSES ABOVE 300 MG MAY BE FATAL. DEATH DUE TO SHOCK AND DEHYDRATION MAY OCCUR WITHIN 24 HOURS OR MAY BE DELAYED 7-14 DAYS AND BE DUE TO RENAL FAILURE OR CARDIOPULMONARY DEPRESSION.

CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE AND PROLONGED LOW LEVEL EXPOSURE MAY CAUSE IRREVERSIBLE RENAL TUBULAR DYSFUNCTION AND BONE EFFECTS AS DESCRIBED IN CHRONIC INHALATION. CHRONIC EXPOSURE TO CADMIUM IN WATER AS THE CHLORIDE CAUSED HYPERTENSION IN RATS. FUNCTIONAL CHANGES IN THE LIVER, PANCREAS AND ADRENAL GLANDS HAVE ALSO BEEN REPORTED IN ANIMALS.

FIRST AID- IF EXTENSIVE VOMITING HAS NOT OCCURRED, THE SUBSTANCE SHOULD BE REMOVED BY EMESIS OR GASTRIC LAVAGE PROVIDED THAT THE PATIENT IS CONSCIOUS AND CONVULSIONS ARE NOT PRESENT. KEEP HEAD BELOW HIPS DURING VOMITING TO PREVENT ASPIRATION. DO NOT ATTEMPT TO MAKE AN UNCONSCIOUS PERSON VOMIT. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREATMENT SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

CADMIUM POISONING:

DO NOT GIVE DIMERCAPROL (BAL). IF SYMPTOMS PERSIST, THE ADMINISTRATION OF CALCIUM DISODIUM EDETATE IS RECOMMENDED. GIVE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD, TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.

FOR INTRAMUSCULAR ADMINISTRATION, GIVE 20% SOLUTION (200 MG/ML), 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

CADMIUM CHLORIDE:

BROMINE TRIFLUORIDE: ATTACKS.
POTASSIUM: FORMS IMPACT SENSITIVE MIXTURE.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CADMIUM AND TOXIC AND CORROSIVE FUMES OF CHLORIDES.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

KEEP IN A TIGHTLY CLOSED CONTAINER. STORE IN A COOL, DRY, VENTILATED AREA.

DISPOSAL

CADMIUM - REGULATORY LEVEL: 1.0 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D006.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. PREVENT DISPERSION OF DUST IN AIR. DO NOT ALLOW SPILLED MATERIAL TO CONTAMINATE WATER SOURCES.

PREVENT DISPERSION OF DUST IN AIR.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG A HOLDING AREA SUCH AS PIT, POND OR LAGOON TO CONTAIN SPILLED MATERIAL. USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT DISSOLVING IN FIREFIGHTING WATER OR RAIN.

WATER SPILL:
ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

ADD FERRIC CHLORIDE TO SPILL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 10 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CADMIUM DUST AND FUME (AS CD):

AT ANY DETECTABLE CONCENTRATION:

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.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 10/30/84 REVISION DATE: 09/26/91

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CADMIUM NITRATE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS03770

CAS#: 10325-94-7 FORMULA: CDN_2O_6

CADMIUM NITRATE IS AN ODORLESS, COLORLESS OR WHITE SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD BY ITSELF; HOWEVER, THE MATERIAL IS AN OXIDIZER. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, DIZZINESS, BLURRED VISION, MUSCLE CRAMPS, CHEST PAIN, COUGHING, CHOKING, DROOLING, STOMACH PAIN, NAUSEA, VOMITING, DIARRHEA, COLDNESS, FAINTING, BLuish SKIN AND FINGERTIPS, KIDNEY DAMAGE, SEIZURES, UNCONSCIOUSNESS, AND POSSIBLE DEATH BY INHALATION

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, RUNNY NOSE, LOSS OF SENSE OF SMELL, YELLOW TEETH, DIFFICULTY WALKING, BACK, ARM, AND LEG PAIN, DIFFICULTY BREATHING, LUNG, LIVER, BLOOD, AND BONE EFFECTS, AND NOSE DAMAGE MAY OCCUR. MAY CAUSE TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. CONTACT WITH FLAMMABLE OR COMBUSTIBLE MATERIALS MAY RESULT IN A FIRE OR EXPLOSION. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS03770

10325-94-7

CADMIUM NITRATE

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OHS03770

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 10325-94-7
RTECS NUMBER: EV1750000

SUBSTANCE: CADMIUM NITRATE

TRADE NAMES/SYNONYMS:

CADMIUM DINITRATE; CDN_2O_6 ; NITRIC ACID, CADMIUM SALT; OHS03770

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: $\text{CD}-(\text{N}-\text{O}_3)_2$

MOLECULAR WEIGHT: 236.42

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: CADMIUM NITRATE
CAS# 10325-94-7

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

CADMIUM:

* OSHA EXPOSURE LIMIT REMOVED AS PER OSHA INSTRUCTION PUB 8-1.4A
0.05 $\text{MG}(\text{CD})/\text{M}^3$ ACGIH TWA (DUST, SALTS)
(NOTICE OF INTENDED CHANGES 1990-91)
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7048).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (OCTOBER 1, 1987)

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS OR WHITE, AMORPHOUS, HYGROSCOPIC, NEEDLE-LIKE CRYSTALLINE SOLID. MELTING POINT: 662 F (350 C)

SPECIFIC GRAVITY: NOT AVAILABLE SOLUBILITY IN WATER: 109% @ 0 C

SOLVENT SOLUBILITY: SOLUBLE IN ACIDS, ETHYL ACETATE, AMMONIA, ALCOHOL.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER. CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:
WATER ONLY, NO DRY CHEMICAL, CARBON DIOXIDE OR HALON
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P5800.5, GUIDE PAGE 42).

FLOOD WITH WATER. COOL ALL AFFECTED CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND. EVACUATE TO 2500 FEET IF FIRE BECOMES UNCONTROLLABLE.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
OXIDIZER

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
OXIDIZER

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

CADMIUM NITRATE:

IRRITATION DATA:

TETRAHYDRATE: 500 MG/24 HOURS SKIN-RABBIT SEVERE; 20 MG/24 HOURS EYE-RABBIT MODERATE.

TOXICITY DATA:

ANHYDROUS: 3850 MG/M3 INHALATION-MOUSE LC50; 100 MG/KG ORAL-MOUSE LD50; 300 MG/KG ORAL-RAT LD50; 200 MG/KG UNREPORTED-RAT LD50; MUTAGENIC DATA (RTECS).

TETRAHYDRATE: 300 MG/KG ORAL-RAT LD50; MUTAGENIC DATA (RTECS).

CARCINOGEN STATUS: HUMAN LIMITED EVIDENCE (IARC GROUP-2A). EXPOSURE TO CADMIUM, PRIMARILY AS THE OXIDE, HAS BEEN ASSOCIATED WITH INCREASED RISKS OF PROSTATIC AND RESPIRATORY CANCERS.

LOCAL EFFECTS: IRRITANT- EYE, SKIN.

ACUTE TOXICITY LEVEL: TOXIC BY INHALATION (ANHYDROUS) AND INGESTION.

TARGET EFFECTS: NEPHROTOXIN. POISONING MAY ALSO AFFECT THE LUNGS, BONE, BLOOD, AND LIVER.*

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH KIDNEY, OR RESPIRATORY DISORDERS.*

ADDITIONAL DATA: DEFICIENCIES IN IRON, CALCIUM, ZINC, PROTEINS, AND VITAMINS C AND D MAY ENHANCE THE TOXIC EFFECTS. ALTERATIONS OF DRUG METABOLIZING ACTIVITIES HAVE BEEN INDUCED IN ANIMALS.*

* MAY BE BASED ON GENERAL INFORMATION ON CADMIUM COMPOUNDS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

CADMIUM NITRATE:

TOXIC.

SEE INFORMATION ON CADMIUM COMPOUNDS.

CADMIUM COMPOUNDS:

NEPHROTOXIN. 50 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- EXPOSURE TO SUFFICIENTLY HIGH CONCENTRATIONS OF CADMIUM DUSTS MAY RESULT IN UPPER RESPIRATORY TRACT IRRITATION WITH DELAYED SYMPTOMS OF COUGH, CHEST PAIN, DIZZINESS, ABDOMINAL PAIN, NAUSEA AND VOMITING. SEVERE EXPOSURES MAY RESULT IN LUNG, KIDNEY OR LIVER DAMAGE OR DEATH FROM MASSIVE PULMONARY EDEMA.

CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE AND RESPIRATORY EFFECTS FROM REPEATED OR PROLONGED EXPOSURE TO DUSTS OR FUMES MAY INCLUDE RHINITIS, BRONCHITIS, EMPHYSEMA, COUGH, DYSPNEA, ABNORMAL LUNG FUNCTION, OBSTRUCTIVE DISEASE, AND POSSIBLY FIBROSIS. ULCERATION OF THE NASAL SEPTUM AND YELLOW DISCOLORATION OF THE TEETH MAY OCCUR. CADMIUM INDUCED KIDNEY DAMAGE IS IRREVERSIBLE AND MAY PROGRESS AFTER EXPOSURE CEASES; SOME CASES OF PROGRESSION TO KIDNEY FAILURE HAVE BEEN DESCRIBED. PROTEINURIA IS USUALLY THE FIRST SIGN OF DAMAGE AND MAY BE ASSOCIATED WITH GLUCOSURIA, AMINOACIDURIA, DECREASED CONCENTRATING CAPACITY, INCREASED EXCRETION OF CALCIUM AND PHOSPHORUS, AND DECREASED CREATININE EXCRETION. CALCIURIA MAY FAVOR THE DEVELOPMENT OF KIDNEY STONES. OSTEOMALACIA, OSTEOPOROSIS, AND SPONTANEOUS AND PSEUDOFRACTURES MAY OCCUR AND MAY BE MANIFESTED AS BACK PAIN, PAIN IN THE EXTREMITIES, DIFFICULTY IN WALKING, AND PAIN ON BONE PRESSURE. OTHER EFFECTS MAY INCLUDE IRRITABILITY, WEIGHT LOSS,

FATIGUE, MILD TO MODERATE ANEMIA, EOSINOPHILIA, DAMAGE TO THE OLFACTORY NERVE WITH ANOSMIA, AND LIVER DAMAGE. AN EPIDEMIOLOGICAL STUDY SUGGESTS A RELATIONSHIP BETWEEN CADMIUM LEVELS IN AIR AND CARDIOVASCULAR DISEASE, BUT A CAUSAL ASSOCIATION HAS NOT BEEN PROVED. OCCUPATIONAL EXPOSURE TO CADMIUM IS IMPLICATED IN A SIGNIFICANT INCREASE IN THE INCIDENCE OF PROSTATIC AND RESPIRATORY CANCERS. ONE STUDY ALSO REPORTS A SIGNIFICANT INCREASE IN RENAL CANCERS IN THOSE WITH INFERRED OCCUPATIONAL EXPOSURE TO CADMIUM.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
CADMIUM NITRATE:
IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION WITH REDNESS AND PAIN. 500 MG OF THE TETRAHYDRATE APPLIED TO RABBIT SKIN CAUSED SEVERE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH IRRITANTS MAY RESULT IN DERMATITIS.

FIRST AID- 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.

EYE CONTACT:
CADMIUM NITRATE:
IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION. 20 MG OF THE TETRAHYDRATE APPLIED TO RABBIT EYES CAUSED MODERATE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH IRRITANTS MAY RESULT IN CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:
CADMIUM NITRATE:
TOXIC.

SEE INFORMATION ON CADMIUM COMPOUNDS.

CADMIUM COMPOUNDS:
NEPHROTOXIN.

ACUTE EXPOSURE- THE PERSISTENT VOMITING INDUCED BY CADMIUM COMPOUNDS MAY LIMIT THE AMOUNT RETAINED, BUT IF SUFFICIENT AMOUNTS ARE ABSORBED, SYMPTOMS OF SYSTEMIC TOXICITY MAY BEGIN WITHIN 15 MINUTES TO 2 HOURS. SALIVATION, CHOKING, SEVERE NAUSEA, ABDOMINAL PAIN, DIARRHEA, TENESMUS, BLURRED VISION, DIZZINESS, HEADACHE, MUSCULAR CRAMPS, EXHAUSTION, COLLAPSE, SHOCK, UNCONSCIOUSNESS AND RARELY, CONVULSIONS MAY OCCUR. RECOVERY MAY BEGIN WITHIN 5-10 HOURS; SEQUELAE MAY INCLUDE DELAYED LIVER AND KIDNEY DAMAGE. SINGLE DOSES OF 10-20 MG OF SOLUBLE CADMIUM SALTS HAVE

INDUCED SEVERE TOXIC EFFECTS AND DOSES ABOVE 300 MG MAY BE FATAL. DEATH DUE TO SHOCK AND DEHYDRATION MAY OCCUR WITHIN 24 HOURS OR MAY BE DELAYED 7-14 DAYS AND BE DUE TO RENAL FAILURE OR CARDIOPULMONARY DEPRESSION. CHRONIC EXPOSURE- CADMIUM IS HIGHLY CUMULATIVE AND PROLONGED LOW LEVEL EXPOSURE MAY CAUSE IRREVERSIBLE RENAL TUBULAR DYSFUNCTION AND BONE EFFECTS AS DESCRIBED IN CHRONIC INHALATION. CHRONIC EXPOSURE TO CADMIUM IN WATER AS THE CHLORIDE CAUSED HYPERTENSION IN RATS. FUNCTIONAL CHANGES IN THE LIVER, PANCREAS AND ADRENAL GLANDS HAVE ALSO BEEN REPORTED IN ANIMALS.

FIRST AID- IF EXTENSIVE VOMITING HAS NOT OCCURRED, THE SUBSTANCE SHOULD BE REMOVED BY EMESIS OR GASTRIC LAVAGE PROVIDED THAT THE PATIENT IS CONSCIOUS AND CONVULSIONS ARE NOT PRESENT. KEEP HEAD BELOW HIPS DURING VOMITING TO PREVENT ASPIRATION. DO NOT ATTEMPT TO MAKE AN UNCONSCIOUS PERSON VOMIT. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREATMENT SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

CADMIUM POISONING:

DO NOT GIVE DIMERCAPROL (BAL). IF SYMPTOMS PERSIST, THE ADMINISTRATION OF CALCIUM DISODIUM EDETATE IS RECOMMENDED. GIVE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD, TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.

FOR INTRAMUSCULAR ADMINISTRATION, GIVE 20% SOLUTION (200 MG/ML), 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

CADMIUM NITRATE:

COMBUSTIBLE PRODUCTS: MIXTURES OF THE TWO MAY RESULT IN A VIOLENT EXPLOSION.

METALS AND ALLOYS: MAY CAUSE IGNITION OR EXPLOSION.

ORGANIC MATERIALS: MAY IGNITE OR EXPLODE ON CONTACT. THE SENSITIVITY FOR EXPLOSION MAY BE INCREASED BY THE PRESENCE OF METAL POWDERS.

REDUCTANTS: MAY REACT VIOLENTLY, CAUSING IGNITION OR EXPLOSION ON CONTACT. SEE ALSO METAL NITRATES.

METAL NITRATES:

CITRIC ACID: POSSIBLE EXPLOSION HAZARD.
ESTERS: POSSIBLE EXPLOSION HAZARD.
PHOSPHINATES: MAY EXPLODE WHEN HEATED.
PHOSPHOROUS: POSSIBLE EXPLOSIVE REACTION.
POTASSIUM HEXANITROCOBALTATE(3-): MAY EXPLODE VIOLENTLY.
REDUCTANTS: POSSIBLE EXPLOSION HAZARD.
TIN(II) CHLORIDE: POSSIBLE EXPLOSIVE HAZARD.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CADMIUM AND NITROGEN.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

KEEP IN A TIGHTLY CLOSED CONTAINER. STORE IN A COOL, DRY, VENTILATED AREA.

CONSULT NFPA PUBLICATION 43A, STORAGE OF LIQUID AND SOLID OXIDIZING MATERIALS, FOR STORAGE REQUIREMENTS.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CADMIUM - REGULATORY LEVEL: 1.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D006.

CONDITIONS TO AVOID

AVOID CONTACT WITH OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). AVOID CONTACT WITH EYES AND SKIN; MATERIAL MAY BE POISONOUS OR CORROSIVE.

SPILL AND LEAK PROCEDURES

WATER SPILL:

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CADMIUM DUST AND FUME (AS CD):

AT ANY DETECTABLE CONCENTRATION:

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.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 11/06/84 REVISION DATE: 03/12/92

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CADMIUM SULFATE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS03800

CAS#: 10124-36-4 FORMULA: CD_04S

CADMIUM SULFATE IS AN ODORLESS WHITE SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, CHEST PAIN, MUSCLE PAIN, COUGHING UP BLOOD, DROOLING, STOMACH PAIN, NAUSEA, VOMITING, DIARRHEA, LUNG CONGESTION, LIVER AND KIDNEY DAMAGE, AND POSSIBLE DEATH BY INGESTION.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, DISCOLORED TEETH, AND NOSE AND LUNG DAMAGE MAY OCCUR. MAY CAUSE TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS03800
10124-36-4
CADMIUM SULFATE

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OHS03800

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 10124-36-4
RTECS NUMBER: EV2700000

SUBSTANCE: CADMIUM SULFATE

TRADE NAMES/SYNONYMS:

CADMIUM SULPHATE; SULFURIC ACID, CADMIUM(2+) SALT;
SULPHURIC ACID, CADMIUM SALT(1:1); CADMIUM MONOSULFATE; C-19; C-20; OHS03800

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: CD-04-S

MOLECULAR WEIGHT: 208.46

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: CADMIUM SULFATE
CAS# 10124-36-4

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

CADMIUM:

* OSHA EXPOSURE LIMIT REMOVED AS PER OSHA INSTRUCTION PUB 8-1.4A
0.05 MG(CD)/M3 ACGIH TWA (DUST, SALTS)
(NOTICE OF INTENDED CHANGES 1990-91)
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7048).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (OCTOBER 1, 1987)

PHYSICAL DATA

DESCRIPTION: ODORLESS, RHOMBIC WHITE CRYSTALS.

MELTING POINT: 1832 F (1000 C) SPECIFIC GRAVITY: 4.69

SOLUBILITY IN WATER: 76% @ 0 C

SOLVENT SOLUBILITY: INSOLUBLE IN ALCOHOL, ACETONE, AMMONIA

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY
RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 53).

EXTINGUISH USING AGENT SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING
VAPORS AND DUSTS. KEEP UPWIND.

TOXICITY

CADMIUM SULFATE:

12760 UG/KG INTRAPERITONEAL-MOUSE LD50; 105 MG/KG ORAL-DOG LDLO; 27 MG/KG
SUBCUTANEOUS-DOG LDLO; 105 MG/KG SUBCUTANEOUS-FROG LDLO; 280 MG/KG ORAL-RAT
LD50; 88 MG/KG ORAL-MOUSE LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS
DATA (RTECS).

CARCINOGEN STATUS: ANTICIPATED HUMAN CARCINOGEN (NTP); HUMAN LIMITED
EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2A). CADMIUM SULFATE
PRODUCED LOCAL SARCOMAS AND TESTICULAR TUMORS IN RATS, AND TESTICULAR
TUMORS IN MICE AFTER SUBCUTANEOUS ADMINISTRATION. EXPOSURE TO CADMIUM,
PRIMARILY AS THE OXIDE, HAS BEEN ASSOCIATED WITH INCREASED RISKS OF
PROSTATIC AND RESPIRATORY CANCERS.

ACUTE TOXICITY LEVEL: TOXIC BY INGESTION.

TARGET EFFECTS: POISONING MAY AFFECT THE BLOOD AND KIDNEYS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

CADMIUM SULFATE:

IRRITANT.

ACUTE EXPOSURE- 4-10 HOURS AFTER INHALING FUMES OR DUST OF CADMIUM COMPOUNDS, NASOPHARYNGEAL IRRITATION, TIGHTNESS IN THE CHEST OR SUBSTERNAL PAIN, DYSPNEA AND COUGH WITH HEMOPTYSIS, FOLLOWED BY PNEUMONITIS AND PULMONARY EDEMA MAY OCCUR. HEADACHE, MUSCLE ACHE, NAUSEA, VOMITING, AND DIARRHEA ARE POSSIBLE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO CADMIUM SALTS MAY CAUSE EMPHYSEMA, RENAL AND LIVER DAMAGE, ANEMIA, WEIGHT LOSS, IRRITABILITY, ULCERATION OF NASAL SEPTUM, AND DISCOLORATION OF THE TEETH. STUDIES HAVE SUGGESTED THAT OCCUPATIONAL EXPOSURE TO CADMIUM IN SOME FORM INCREASES THE RISK OF PROSTATE, RESPIRATORY, AND GENITOURINARY CANCERS IN HUMANS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

CADMIUM SULFATE:

IRRITANT.

ACUTE EXPOSURE- THE CHEMICAL MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE WITH IRRITANTS MAY CAUSE DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

CADMIUM SULFATE:

IRRITANT.

ACUTE EXPOSURE- IT MAY IRRITATE THE EYES.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE WITH IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

CADMIUM SULFATE:

TOXIC.

ACUTE EXPOSURE- CADMIUM SALTS MAY CAUSE HEADACHE, MUSCLE ACHES, SALIVATION, NAUSEA, VOMITING, ABDOMINAL PAIN, DIARRHEA, LIVER AND KIDNEY DAMAGE, AND RENAL FAILURE. LOW LEVELS HAVE BEEN LETHAL TO ANIMALS.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- GIVE MILK OR BEATEN EGGS EVERY 4 HOURS TO RELIEVE GASTROINTESTINAL IRRITATION. REMOVE UNABSORBED CADMIUM BY CATHARSIS WITH FLEET'S PHOSPHO-SODA, 30-60 ML DILUTED 1:4 IN WATER (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREATMENT MUST BE ADMINISTERED BY MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO

WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

CADMIUM POISONING:

DO NOT GIVE DIMERCAPROL (BAL). IF SYMPTOMS PERSIST, THE ADMINISTRATION OF CALCIUM DISODIUM EDETATE IS RECOMMENDED. GIVE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD, TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.

FOR INTRAMUSCULAR ADMINISTRATION, GIVE 20% SOLUTION (200 MG/ML), 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

CADMIUM SULFATE:

NO DATA AVAILABLE.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND HAZARDOUS OXIDES OF CADMIUM.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****DISPOSAL****

CADMIUM - REGULATORY LEVEL: 1.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D006.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. PREVENT DISPERSION OF DUST IN AIR. DO NOT ALLOW SPILLED MATERIAL TO CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT MATERIAL FROM DISSOLVING IN FIRE EXTINGUISHING WATER OR RAIN.

WATER SPILL:

USE ACTIVATED CARBON TO ABSORB SPILLED SUBSTANCE THAT IS DISSOLVED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CADMIUM DUST AND FUME (AS CD):

AT ANY DETECTABLE CONCENTRATION:

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.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH HIGH-EFFICIENCY
PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

PROTECTIVE CLOTHING NOT REQUIRED. AVOID REPEATED OR PROLONGED CONTACT WITH
THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT
EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY
BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH
FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CERIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS04390

CAS#: 7440-45-1 FORMULA: CE

CERIUM IS A GREY METAL.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO PUT OUT THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE EYES. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, CHILLS, FEVER, AND BLOOD IN THE URINE.

LONG TERM EXPOSURE: MAY CAUSE LIVER AND LUNG EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT WITH WATER OR MOIST AIR. MAY CATCH FIRE FROM FRICTION. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS04390

7440-45-1

CERIUM

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OHS04390

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-45-1
RTECS NUMBER: FK4850000

SUBSTANCE: CERIUM

TRADE NAMES/SYNONYMS:

CERIUM, CRUDE POWDER; CERIUM, CRUDE, SLABS OR INGOTS; CE; UN 1333; OHS04390

CHEMICAL FAMILY:

METAL

MOLECULAR FORMULA: CE

MOLECULAR WEIGHT: 140.12

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=3 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=3

COMPONENTS AND CONTAMINANTS

COMPONENT: CERIUM
CAS# 7440-45-1

PERCENT: 100.0

OTHER CONTAMINANTS: NONE.

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: GREY, DUCTILE, MALLEABLE METAL FOUND AS A FACE-CENTERED CUBIC
STRUCTURE AT ROOM TEMPERATURE. BOILING POINT: 6229 F (3443 C)

MELTING POINT: 1468 F (798 C) SPECIFIC GRAVITY: 6.689 - 6.770

SOLUBILITY IN WATER: DECOMPOSES

SOLVENT SOLUBILITY: SOLUBLE IN DILUTE MINERAL ACIDS; INSOLUBLE IN ALKALIES.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

AUTOIGNITION TEMP.: 300 F (149 C)

FIREFIGHTING MEDIA:

DRY CHEMICAL, SAND, EARTH, WATER SPRAY OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180), DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204. EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
CERIUM-UN 1333

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:

4.1 - FLAMMABLE SOLID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE SOLID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 15 KG
CARGO AIRCRAFT ONLY: 50 KG

TOXICITY

CERIUM:
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: POISONING MAY AFFECT THE LUNGS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

CERIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.

CHRONIC EXPOSURE- UPON INHALATION OF CERIUM DUST FOR AN EXTENDED PERIOD OF TIME, PERSONS MAY DEVELOP CER-PNEUMOCONIOSIS, WHICH IS CHARACTERIZED BY THE FORMATION OF SMALL, MILIARY, HOMOGENEOUSLY DISTRIBUTED INFILTRATES IN THE LUNGS. CER-PNEUMOCONIOSIS MAY WORSEN INTO PERIFOCAL EMPHYSEMA AND FIBROSIS OF THE LUNGS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

CERIUM:

ACUTE EXPOSURE- NO EFFECTS REPORTED FROM CONTACT WITH INTACT SKIN.

APPLICATION TO ABRADED SKIN MAY RESULT IN EPILATION AND SCAR FORMATION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

CERIUM:

ACUTE EXPOSURE- MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

CERIUM:

ACUTE EXPOSURE- ABSORPTION FROM THE GASTROINTESTINAL TRACT OF RATS IS LESS THAN 1% OF THE ADMINISTERED DOSE. ADVERSE EFFECTS FROM INGESTION HAVE NOT BEEN REPORTED.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

CERIUM:

MAY REACT WITH WATER OR MOIST AIR. MAY CATCH FIRE FROM FRICTION. FINELY DIVIDED POWDER MAY SELF-IGNITE.

INCOMPATIBILITIES:

CERIUM:

ANTIMONY: EXOTHERMIC REACTION.

BISMUTH: EXOTHERMIC REACTION.

CARBON DIOXIDE AND NITROGEN: IGNITION REACTION.

HALOGEN VAPOR: IGNITION AT 200 C.

PHOSPHOROUS: VIOLENT REACTION ABOVE 400 C.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

SILICON: VIOLENT EXOTHERMIC REACTION AT 1400 C.

ZINC: EXPLOSIVE REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING

OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN A COOL, DRY PLACE; KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE.
STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBERS, D001 AND D003. 100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES OR OTHER SOURCES OF IGNITION. MATERIAL IS EXTREMELY FLAMMABLE AND MAY BURN RAPIDLY WITH FLARE-BURNING EFFECT.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL SPILLS, WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, WET DOWN WITH WATER AND DIKE FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CESIUM, METAL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS04505

CAS#: 7440-46-2 FORMULA: CS

CESIUM, METAL, IS A SILVER-WHITE METAL OR A SILVER LIQUID.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. DANGEROUS EXPLOSION HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, MOUTH, STOMACH, SKIN, AND EYES.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY CATCH FIRE AT ROOM TEMPERATURE. MAY REACT WITH COLD WATER OR ICE TO RELEASE A CORROSIVE LIQUID AND FLAMMABLE GAS WITH THE GENERATION OF MUCH HEAT OR EXPLOSION. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS04505

7440-46-2

CESIUM, METAL

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OHS04505

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-46-2
RTECS NUMBER: FK9225000

SUBSTANCE: CESIUM, METAL

TRADE NAMES/SYNONYMS:

CESIUM; CAESIUM; CESIUM-133; STCC 4916405; UN 1407; C-22; OHS04505

CHEMICAL FAMILY:

METAL

MOLECULAR FORMULA: CS

MOLECULAR WEIGHT: 132.91

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=3 PERSISTENCE=3

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=3 REACTIVITY=3

COMPONENTS AND CONTAMINANTS

COMPONENT: CESIUM, METAL
CAS# 7440-46-2

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: HEXAGONAL CRYSTALS, SILVER-WHITE, DUCTILE METAL OR SILVERY

LIQUID BOILING POINT: 1301 F (705 C) MELTING POINT: 83 F (28 C)

SPECIFIC GRAVITY: 1.873 VAPOR PRESSURE: 1 MMHG @ 279 C

SOLUBILITY IN WATER: REACTS VIOLENTLY

SOLVENT SOLUBILITY: LIQUID AMMONIA, ACIDS, AND ALCOHOL

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MAY IGNITE SPONTANEOUSLY IN MOIST AIR.

FIREFIGHTING MEDIA:
DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT
WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

EXTINGUISH USING AGENTS INDICATED. DO NOT USE WATER. AVOID BREATHING POISONOUS
VAPORS.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.206
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
CESIUM-UN 1407

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG I

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
DANGEROUS WHEN WET

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.211
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 15 KG

TOXICITY

CESIUM, METAL:
TOXICITY DATA: 1700 MG/KG INTRAPERITONEAL-MOUSE LD50.
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.
TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
CESIUM, METAL:
CORROSIVE.
ACUTE EXPOSURE- THE CHEMICAL MAY SEVERELY IRRITATE MUCOUS MEMBRANES.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
CESIUM, METAL:
CORROSIVE.
ACUTE EXPOSURE- SKIN BURNS MAY OCCUR UPON CONTACT.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS OR EFFECTS SIMILAR TO THOSE IN ACUTE EXPOSURE.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
CESIUM, METAL:
CORROSIVE.

ACUTE EXPOSURE- IT MAY CAUSE SEVERE EYE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS OR EFFECTS SIMILAR TO THOSE IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
CESIUM, METAL:
CORROSIVE:

ACUTE EXPOSURE- THE CHEMICAL MAY CAUSE SEVERE IRRITATION OF THE GASTROINTESTINAL TRACT. IT CAN ACT AS AN ANALOG OF POTASSIUM AND THUS BE POTENTIALLY HARMFUL. IT IS LIKELY THAT REPLACEMENT OF POTASSIUM BY CESIUM WOULD CAUSE ADVERSE NEUROMUSCULAR EFFECTS, AS SEEN IN ANIMAL EXPERIMENTS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
SPONTANEOUSLY FLAMMABLE AT ROOM TEMPERATURE IF SURFACE OF CESIUM IS CLEAR. EXOTHERMIC REACTION WITH WATER RELEASES CORROSIVE CESIUM HYDROXIDE AND FLAMMABLE HYDROGEN. AT 20 C THE HEAT OF THE REACTION IS ADEQUATE TO IGNITE THE HYDROGEN. IT MAY REACT EXPLOSIVELY WITH COLD WATER, AND MAY REACT WITH ICE AT TEMPERATURES ABOVE -116 C.

INCOMPATIBILITIES:
CESIUM:

CHLORINE GAS: REACTS WITH LUMINOUS FLAME.
HALOGENS: VIOLENT REACTION WITH SPONTANEOUS IGNITION AND/OR EXPLOSION.
OXIDIZERS: VIGOROUS REACTION.
OXYGEN: SPONTANEOUSLY BURNS IN DRY OXYGEN.
PHOSPHORUS: VIGOROUS REACTION BELOW 250 C.
SULFUR: VIOLENT REACTION WITH SPONTANEOUS IGNITION AND/OR EXPLOSION.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CHROMIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS05000

CAS#: 7440-47-3 FORMULA: CR

CHROMIUM IS AN ODORLESS GRAY METAL OR POWDER.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST OR FUMES MAY CAUSE IRRITATION OF THE NOSE AND THROAT.

LONG TERM EXPOSURE: NO INFORMATION IS AVAILABLE.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS05000

7440-47-3

CHROMIUM

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MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-47-3
RTECS NUMBER: GB4200000

SUBSTANCE: CHROMIUM

TRADE NAMES/SYNONYMS:

CHROME; CHROMIUM ELEMENT; CHROMIUM METAL; METALLIC CHROMIUM; CR; OHS05000

CHEMICAL FAMILY:

METAL

MOLECULAR FORMULA: CR

MOLECULAR WEIGHT: 51.996

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: CHROMIUM
CAS# 7440-47-3

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

CHROMIUM:

1 MG/M3 OSHA TWA
0.5 MG/M3 ACGIH TWA
0.5 MG/M3 NIOSH RECOMMENDED TWA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7024).

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: ODORLESS, STEEL-GRAY, LUSTROUS METAL OR POWDER.

BOILING POINT: 4842 F (2672 C) MELTING POINT: 3339-3411 F (1837-1877 C)

SPECIFIC GRAVITY: 7.20 @ 28 C VAPOR PRESSURE: 1 MMHG @ 1616

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN DILUTE SULFURIC ACID, HYDROCHLORIC ACID;
INSOLUBLE IN NITRIC ACID, AQUA REGIA.

AUTOIGNITION TEMPERATURE: 1076 F (580 C) (CLOUD); 752 F (400 C) (LAYER)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE
FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FINELY DIVIDED MATERIAL MAY IGNITE ON EXPOSURE TO AIR.

LOWER EXPLOSIVE LIMIT: 0.230 OZ/FT3

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE
METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA
FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE
UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM
AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5,
GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING
MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154

EXCEPTIONS: 49 CFR 173.153

TOXICITY

CHROMIUM:

TOXICITY DATA: 27500 UG/KG UNREPORTED ROUTE-RAT LD50; TUMORIGENIC DATA (RTECS)
CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL INADEQUATE EVIDENCE (IARC
GROUP-3 FOR CHROMIUM METAL).

ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.

TARGET EFFECTS: POISONING MAY AFFECT THE LIVER AND KIDNEYS.*

ADDITIONAL DATA: CHROMIUM MAY CROSS THE PLACENTA AND BE EXCRETED IN BREAST
MILK.

* MAY BE BASED ON GENERAL INFORMATION ON CHROMIUM COMPOUNDS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

CHROMIUM:

ACUTE EXPOSURE- HIGH CONCENTRATIONS OF DUSTS OR FUMES MAY CAUSE
IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO VARIOUS CHROMIUM
COMPOUNDS HAS BEEN REPORTED TO RESULT IN ULCERATION AND PERFORATION OF
THE NASAL SEPTUM, IRRITATION OF THE THROAT AND LOWER RESPIRATORY TRACT,
LESS COMMONLY IN GASTROINTESTINAL DISTURBANCES, BLOOD CHANGES,
PULMONARY SENSITIZATION, PULMONARY PNEUMOCONIOSIS OR FIBROSIS, AND
RARELY LIVER EFFECTS. THESE EFFECTS HAVE NOT BEEN REPORTED FROM EXPOSURE
TO THE METAL PER SE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING
HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST.
TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

CHROMIUM:

ACUTE EXPOSURE- CONTACT WITH DUSTS OR POWDER MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO VARIOUS CHROMIUM
COMPOUNDS HAS BEEN REPORTED TO CAUSE VARIOUS TYPES OF DERMATITIS,
INCLUDING ECZEMA, "CHROME HOLES", SENSITIZATION, AND, IN CONTACT WITH
DAMAGED SKIN, KIDNEY DAMAGE. THESE EFFECTS HAVE NOT BEEN REPORTED FROM
EXPOSURE TO THE METAL PER SE.

FIRST AID- 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.

EYE CONTACT:

CHROMIUM:

ACUTE EXPOSURE- CONTACT WITH DUSTS OR POWDERS MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO SOME CHROMIUM
COMPOUNDS MAY CAUSE CONJUNCTIVITIS AND LACRIMATION. THESE EFFECTS HAVE
NOT BEEN REPORTED FROM EXPOSURE TO THE METAL PER SE.

FIRST AID- WASH 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.

INGESTION:

CHROMIUM:

ACUTE EXPOSURE- CHROMIUM METAL IS POORLY ABSORBED BY THE INTESTINAL TRACT. ABSORPTION OF SUFFICIENT AMOUNTS OF SOME CHROMIUM COMPOUNDS MAY RESULT IN DIZZINESS, INTENSE THIRST, ABDOMINAL PAIN, VOMITING, SHOCK, OLIGURIA OR ANURIA, AND UREMIA, WHICH MAY BE FATAL.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

CHROMIUM POISONING:

USE OF DIMERCAPROL HAS BEEN SUGGESTED ON THE BASIS OF FINDINGS IN ANIMALS. GIVE 3 MG/KG (OR 0.3 ML/10 KG) EVERY 4 HOURS, INTRAMUSCULARLY FOR THE FIRST 2 DAYS AND THEN 2 MG/KG EVERY 12 HOURS FOR A TOTAL OF 10 DAYS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

CHROMIUM:

ALKALI CARBONATES: ATTACKED.
ALKALIES (CAUSTIC): ATTACKED.
AMMONIUM NITRATE (FUSED): VIOLENT OR EXPLOSIVE REACTION.
BROMINE PENTAFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.
HYDROGEN PEROXIDE: VIOLENT DECOMPOSITION REACTION.
LITHIUM (MOLTEN): VIGOROUS REACTION AT ELEVATED TEMPERATURES.
NITROGEN OXIDE: INCANDESCENT REACTION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
POTASSIUM CHLORATE (FUSED): VIGOROUS INCANDESCENT REACTION.
SULPHUR DIOXIDE: INCANDESCENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC CHROMIC OXIDE.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

KEEP IN A TIGHTLY CLOSED CONTAINER. STORE IN A COOL, DRY, VENTILATED AREA.

****DISPOSAL****

CHROMIUM - REGULATORY LEVEL: 5.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D007.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

REPORTABLE QUANTITY (RQ): 5000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CHROMIUM, METAL AND INSOLUBLE SALTS (AS CR):

2.5 MG(CR)/M3- ANY DUST AND MIST RESPIRATOR.

5 MG(CR)/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND
QUARTER-MASK RESPIRATORS.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

12.5 MG(CR)/M3- ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST
FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW
MODE.

25 MG(CR)/M3- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING
FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

500 MG(CR)/M3- ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS
OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE
MODE.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING
APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CHROMIC ANHYDRIDE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS04940

CAS#: 1333-82-0 FORMULA: CrO_3

CHROMIC ANHYDRIDE IS A DARK PURPLISH-RED SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD BY ITSELF; HOWEVER, THE MATERIAL IS AN OXIDIZER. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, STOMACH, SKIN, AND EYES WITH POSSIBLE BLINDNESS, AND ALLERGIC REACTIONS. ADDITIONAL EFFECTS MAY INCLUDE RUNNY NOSE, BLUISH COLOR OF THE SKIN, HEADACHE, COUGHING, SNEEZING, BLOODY DIARRHEA, VOMITING, THIRST, INABILITY TO URINATE, DIZZINESS, FEVER, LUNG CONGESTION, KIDNEY DAMAGE, AND POSSIBLE DEATH.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE EYES WITH TEARING MAY OCCUR. ADDITIONAL EFFECTS MAY INCLUDE LIVER DAMAGE WITH YELLOW SKIN, NOSE DAMAGE, LOSS OF SENSE OF SMELL AND TASTE, TOOTH DAMAGE AND DISCOLORATION, AND EAR DAMAGE.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

NORMALLY STABLE, BUT MAY REACT WITH WATER GENERATING HEAT. CONTACT WITH FLAMMABLE OR COMBUSTIBLE MATERIALS MAY RESULT IN A FIRE OR EXPLOSION. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS04940

1333-82-0

CHROMIC ANHYDRIDE

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OHS04940

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 1333-82-0
RTECS NUMBER: GB6650000

SUBSTANCE: CHROMIC ANHYDRIDE

TRADE NAMES/SYNONYMS:

CHROMIUM(6+) TRIOXIDE; CHROMIUM TRIOXIDE; CHROMIC ACID;
CHROMIUM OXIDE (CR03); CHROMIUM(VI) TRIOXIDE; MONOCHROMIUM TRIOXIDE;
MONOCHROMIUM OXIDE; CHROMIUM(VI) OXIDE; CHROMIC TRIOXIDE; CHROMIUM OXIDE;
CHROMIC ACID, SOLID; CHROMIUM OXIDE (CR4012); STCC 4918510; NA 1463; CR03;
OHS04940

CHEMICAL FAMILY:
METAL OXIDE

MOLECULAR FORMULA: CR-03

MOLECULAR WEIGHT: 99.99

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=1 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: CHROMIC ANHYDRIDE
CAS# 1333-82-0

PERCENT: 100.0

EXPOSURE LIMITS:

CHROMIC ACID AND CHROMATES:

0.1 MG(CR03)/M3 OSHA CEILING
0.05 MG(CR)/M3 ACGIH TWA
0.001 MG(CR(VI))/M3 NIOSH RECOMMENDED TWA

MEASUREMENT METHOD: PARTICULATE FILTER; REAGENT; VISIBLE SPECTROPHOTOMETRY;
(NIOSH VOL. III # 7600, HEXAVALENT CHROMIUM).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS (HEXAVALENT CHROMIUM COMPOUNDS)
(FEBRUARY 27, 1987)

CHROMIC ACID (SOLUTIONS):

10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: DARK PURPLISH-RED DELIQUESCENT CRYSTALS, FLAKES OR GRANULAR POWDER. BOILING POINT: 482 F (250 C) DECOMPOSES
MELTING POINT: 385 F (196 C) SPECIFIC GRAVITY: 2.70
PH: ACIDIC IN SOLUTION SOLUBILITY IN WATER: 61.7% @ 0 C (REACTS)
SOLVENT SOLUBILITY: SOLUBLE IN SULFURIC ACID, NITRIC ACID.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER. CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:
WATER ONLY, NO DRY CHEMICAL, CARBON DIOXIDE OR HALON
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P5800.5, GUIDE PAGE 42).

USE FLOODING QUANTITIES OF WATER; APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING DUSTS.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
OXIDIZER

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
OXIDIZER

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.164
EXCEPTIONS: 49 CFR 173.153

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
CHROMIUM TRIOXIDE, ANHYDROUS-NA 1463

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
5.1 - OXIDIZER

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
OXIDIZER, CORROSIVE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 KG
CARGO AIRCRAFT ONLY: 25 KG

TOXICITY

CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE):
TOXICITY DATA: 110 UG/M3 INHALATION-HUMAN TCLO; 80 MG/KG ORAL-RAT LD50;
127 MG/KG ORAL-MOUSE LD50; 20 MG/KG SUBCUTANEOUS-MOUSE LDLO;
14 MG/KG INTRAPERITONEAL-MOUSE LD50; MUTAGENIC DATA (RTECS):
REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: KNOWN HUMAN CARCINOGEN (NTP); HUMAN SUFFICIENT EVIDENCE
ANIMAL LIMITED EVIDENCE (IARC GROUP-1 FOR HEXVALENT CHROMIUM COMPOUNDS).
AN EXCESS RISK FOR LUNG AND SINONASAL CANCER HAS BEEN REPORTED IN WORKERS
IN THE CHROMATE PRODUCTION, CHROMATE PIGMENT PRODUCTION AND CHROMIUM
PLATING INDUSTRIES. CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE) HAS BEEN TESTED
AS A MIST BY INHALATION AT TWO DOSE LEVELS IN MICE AND AS A SOLID BY
INTRABRONCHIAL IMPLANTATION IN THREE STUDIES IN RATS. IN MICE, A LOW
INCIDENCE OF LUNG ADENOCARCINOMAS WAS OBSERVED AT THE HIGHER DOSE AND OF
NASAL PAPILOMAS AT THE LOWER DOSE; PERFORATION OF THE NASAL SEPTUM WAS
OBSERVED AT BOTH DOSE LEVELS. A FEW LUNG TUMORS WERE SEEN IN TWO OF THE

STUDIES BY INTRABRONCHIAL ADMINISTRATION IN RATS.
 LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
 ACUTE TOXICITY LEVEL: TOXIC BY INGESTION.
 TARGET EFFECTS: SENSITIZER- RESPIRATORY, DERMAL, ORAL; NEPHROTOXIN.
 POISONING MAY ALSO AFFECT THE BLOOD, NERVOUS SYSTEM, LIVER, AND CIRCULATORY SYSTEM.*
 AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING RESPIRATORY DISEASE OR INJURY, SKIN DISEASE, VASCULATURE DAMAGE, LIVER DISEASE, OR BLOOD DISORDERS.*
 ADDITIONAL DATA: MAY BE EXCRETED IN BREAST MILK. CROSS-SENSITIZATION REACTIONS MAY OCCUR BETWEEN HEXAVALENT AND TRIVALENT CHROMIUM COMPOUNDS.*

* MAY BE BASED ON GENERAL INFORMATION ON HEXAVALENT CHROMIUM COMPOUNDS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
 CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE):
 CORROSIVE.

SEE INFORMATION ON HEXAVALENT CHROMIUM COMPOUNDS. MAY CAUSE CORROSIVE INJURY TO THE MUCOUS MEMBRANES. THE SYMPTOMS OF PULMONARY EDEMA MAY BE DELAYED FOR SEVERAL HOURS. CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE) WAS TESTED AS A MIST BY INHALATION AT TWO DOSE LEVELS (3.63 MG/M3 AND 1.81 MG/M3) IN MICE. A LOW INCIDENCE OF LUNG ADENOCARCINOMAS WAS OBSERVED AT THE HIGHER DOSE AND OF NASAL PAPILLOMAS AT THE LOWER DOSE; PERFORATION OF THE NASAL SEPTUM WAS OBSERVED AT BOTH DOSE LEVELS.

HEXAVALENT CHROMIUM COMPOUNDS:
 SENSITIZER/NEPHROTOXIN/CARCINOGEN.

30 MG(CR)/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- MAY CAUSE IRRITATION AND TRACHEOBRONCHITIS CHARACTERIZED BY COUGH, SORE THROAT, CHEST PAIN, LIGHTEADEDNESS, HEADACHE, SINUSITIS, LARYNGITIS, SNEEZING, RHINORRHEA, WHEEZING, DYSPNEA, PULMONARY EDEMA, ANOREXIA, FEVER, AND GENERALIZED BRONCHOSPASM HAVE ALSO BEEN REPORTED. TRACHEOBRONCHIAL IRRITATION AND EDEMA MAY PERSIST AFTER OTHER SYMPTOMS SUBSIDE. SENSITIZATION REACTIONS MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS.

CHRONIC EXPOSURE- REPEATED EXPOSURE HAS PRODUCED INFLAMMATION, BLEEDING, PAINLESS, SLOW TO HEAL ULCERATIONS AND PERFORATION OF THE NASAL SEPTUM WITH A FOUL DISCHARGE. THESE EFFECTS HAVE OCCURRED IN WORKERS AT CONCENTRATIONS RANGING FROM 0.06-0.72 MG/M3 AND VARYING LENGTHS OF EXPOSURE. CONGESTION, HYPEREMIA, RHINITIS, PHARYNGITIS, TRACHEITIS, LUNG INFLAMMATION, EMPHYSEMA, BRONCHITIS, BRONCHOPNEUMONIA, AND POLYPS AND HOARSENESS OF THE LARYNX AND POLYPS OR CYSTS OF THE SINUSES HAVE ALSO BEEN REPORTED. X-RAYS REVEALED ENLARGEMENT OF THE HILAR REGION AND LYMPH NODES, INCREASE IN PERIBRONCHIAL AND PERIVASCULAR LUNG MARKINGS AND ADHESIONS OF THE DIAPHRAGM. NODULAR AND NON-NODULAR PNEUMOCONIOSIS, DENTAL EROSION, AND CUTANEOUS AND DENTAL DISCOLORATION, PERFORATED EAR DRUM, LOSS OF SENSE OF SMELL AND TASTE, AND BLOOD CHANGES INCLUDING LEUCOCYTOSIS OR LEUCOPENIA MAY OCCUR. WORKERS WITH A HIGH DEGREE OF EXPOSURE SHOWED A PATTERN OF NEPHROTOXICITY, AS EVIDENCED BY INCREASES IN THE INDICES FOR RENAL TUBULAR DAMAGE. GASTROINTESTINAL DISTURBANCES INCLUDING SPASMS, GASTRITIS AND ULCERS OF THE STOMACH AND INTESTINES, AND HEPATITIS WITH OR WITHOUT JAUNDICE MAY OCCUR. SEVERE LIVER DAMAGE AND

CENTRAL NERVOUS SYSTEM INVOLVEMENT HAVE BEEN REPORTED IN WORKERS. ALSO, DISTURBANCE OF SHORT-TERM MEMORY AND ATTENTION SPAN WERE REPORTED. SENSITIZATION REACTIONS MAY OCCUR RESULTING IN BRONCHIAL ASTHMATIC ATTACKS WHICH MAY HAVE A LAG TIME OF 4-8 HOURS BETWEEN EXPOSURE AND THE ATTACK. KERATOSIS OF THE LIPS, GINGIVA AND PALATE HAVE BEEN REPORTED AFTER YEARS OF EXPOSURE. AN EXCESS RISK FOR LUNG AND SINONASAL CANCER BEEN REPORTED IN WORKERS IN THE CHROMATE PRODUCTION, CHROMATE PIGMENT PRODUCTION AND CHROMIUM PLATING INDUSTRIES. AN INCREASE IN CHROMOSOMAL ABERRATIONS IN PERIPHERAL BLOOD LYMPHOCYTES (3.6-9.4% CELLS WITH ABERRATIONS COMPARED WITH 1.9% IN UNEXPOSED CONTROLS) HAS BEEN REPORTED IN WORKERS. IMMUNE DEPRESSION WAS NOTED IN RATS EXPOSED TO 0.2 MG/M3 CONTINUOUSLY FOR 90 DAYS; THE IMMUNE SYSTEM WAS STIMULATED @ <0.1 MG/M3. ADVERSE EFFECTS ON THE MACROPHAGES WERE REPORTED IN RABBITS EXPOSED FOR 4-6 WEEKS. DIFFUSE THICKENING OF THE ALVEOLAR WALLS AND PROLIFERATION OF CELLS ALONG THE BLOOD VESSELS AND BRONCHI WERE REPORTED IN ANIMALS EXPOSED TO AN ATMOSPHERE COMPARABLE TO THAT OF A CHROMATE PLANT.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE):
CORROSIVE.

SEE INFORMATION ON HEXAVALENT CHROMIUM COMPOUNDS. CONTACT MAY PRODUCE CORROSION AND BURNS. CHROMIC ACID BURNS CAN RESULT IN SYSTEMIC TOXICITY. EXTERNAL BURNS OF 10% OF THE TOTAL BODY SURFACE WERE FATAL IN ONE CASE, WHEREAS 20% BURNS PRODUCED HEPATIC DAMAGE, ACUTE RENAL FAILURE, AND NORMOCHROMIC AND NORMOCYTIC ANEMIA IN ANOTHER.

HEXAVALENT CHROMIUM COMPOUNDS: SENSITIZER/NEPHROTOXIN.

ACUTE EXPOSURE- MAY CAUSE IRRITATION AND CORROSION. APPLICATION TO BROKEN SKIN HAS PRODUCED LOCAL NECROSIS, NAUSEA, VOMITING, SHOCK, COMA, KIDNEY NECROSIS, AND DEATH. SENSITIZATION REACTIONS MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY CAUSE IRRITATIVE DERMATITIS, SENSITIZATION DERMATITIS, AND CHROME ULCERS. SUNLIGHT SENSITIVITY HAS ALSO BEEN REPORTED. DERMATITIS MAY APPEAR AS ERYTHEMA, SCATTERED PAPULES, ECZEMA OR DYSHIDRIOTIC POMPHOLYX; IT OCCURS MOST COMMONLY ON THE HANDS, WRISTS, AND FOREARMS, BUT FREQUENTLY ON THE EYELIDS, NECK, OR ANY OTHER PART OF THE BODY IN CONTACT WITH THE MIST OR SOLUTION. IT IS VERY PERSISTENT AND MAY FAIL TO IMPROVE EVEN MANY YEARS AFTER CESSATION OF EXPOSURE. REPEATED ATTACKS OF SENSITIZATION REACTIONS MAY BE OF INCREASING SEVERITY. ULCERATION OCCURS ANYWHERE ON THE BODY WHERE THE SKIN IS BROKEN. KIDNEY DAMAGE IN WORKERS HAS BEEN REPORTED FROM ABSORPTION THROUGH DAMAGED SKIN.

FIRST AID- 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). LESIONS CAN BE SCRUBBED WITH A 20% SOLUTION OF SODIUM HYPOSULFITE OR TREATED WITH CALCIUM DISODIUM EDETATE OINTMENTS. FRESHLY PREPARED AND PROMPTLY APPLIED 10% ASCORBIC ACID SOLUTION MAY SPEED HEALING OF ULCERS (GOSSELIN, CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 5TH ED.), AS WILL 1% SOLUTION OF ALUMINUM ACETATE WET DRESSING (ARENA, POISONING 4TH ED.).

EYE CONTACT:

CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE):

CORROSIVE.

SEE INFORMATION OF HEXAVALENT CHROMIUM COMPOUNDS. DIRECT CONTACT MAY PRODUCE CORROSION, PAIN, BLURRED VISION, SEVERE BURNS, AND POSSIBLY LOSS OF VISION.

HEXAVALENT CHROMIUM COMPOUNDS:

ACUTE EXPOSURE- MAY CAUSE GENERALIZED IRRITATION OF THE CONJUNCTIVA.

DICHROMATES MAY CAUSE CORNEAL INJURY CAUSING SWELLING OF THE CORNEAL STROMA.

CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT MAY PRODUCE CONJUNCTIVITIS, LACRIMATION, AND DARK RED BANDS AROUND THE CORNEA.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE):

CORROSIVE/TOXIC.

SEE INFORMATION ON HEXAVALENT CHROMIUM COMPOUNDS.

HEXAVALENT CHROMIUM COMPOUNDS:

SENSITIZER/NEPHROTOXIN.

ACUTE EXPOSURE- MAY CAUSE ACUTE FULMINATING GASTROENTERITIS WITH NAUSEA, VOMITING, THIRST, VERTIGO, OLIGURIA, ANURIA, CHOLERA-LIKE STOOLS, MUSCLE CRAMPS, CONVULSIONS, AND COMA. EARLY DEATHS MAY RESULT FROM BLOOD LOSS INTO THE GASTROINTESTINAL TRACT AND AT OTHER SITES, CAUSING CARDIOVASCULAR SHOCK. SURVIVAL OF THE INITIAL PHASE MAY BE FOLLOWED BY RENAL AND HEPATIC NECROSIS AND FAILURE WHICH MAY BE FATAL. FATAL CASES HAVE BEEN REPORTED IN WHICH THE PERSON SHOWED SYMPTOMS WHICH MIMICKED HEPATIC COMA; CONVULSIONS OCCURRED DURING THE FINAL STAGES. THE APPROXIMATE LETHAL DOSE IS 1.0-16.0 GRAMS. CHROMATE DERMATITIS MAY BE AGGRAVATED BY INGESTION OF CHROMATES.

CHRONIC EXPOSURE- FIVE CASES OF STOMACH CANCER HAVE BEEN REPORTED, APPARENTLY FROM SWALLOWING OF CHROMATE DUST OR FROM EXCESSIVE MOUTH BREATHING. ADMINISTRATION IN DRINKING WATER @ 0.45-25 PPM/1 YEAR WAS NONTOXIC TO RATS. PROLONGED ADMINISTRATION TO RATS PRODUCED HYPOACTIVITY, WHICH INDICATES CHROMIUM MAY AFFECT THE CENTRAL NERVOUS SYSTEM.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. MAINTAIN BLOOD PRESSURE AND

AIRWAY. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

CHROMIUM POISONING:

USE OF DIMERCAPROL HAS BEEN SUGGESTED ON THE BASIS OF FINDINGS IN ANIMALS. GIVE 3 MG/KG (OR 0.3 ML/10 KG) EVERY 4 HOURS, INTRAMUSCULARLY FOR THE FIRST 2 DAYS AND THEN 2 MG/KG EVERY 12 HOURS FOR A TOTAL OF 10 DAYS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

REACTS EXOTHERMICALLY WITH WATER.

INCOMPATIBILITIES:

CHROMIC ANHYDRIDE (CHROMIUM TRIOXIDE):

ACETIC ACID: EXPLODES WHEN HEATED.
ACETALDEHYDE: EXPLOSION HAZARD.
ACETIC ANHYDRIDE: PROBABLE EXPLOSION.
ACETIC ANHYDRIDE + 3-METHYLPHENOL: VIOLENT EXOTHERMIC REACTION.
ACETIC ANHYDRIDE + TETRAHYDRONAPHTHALENE: FIRE HAZARD.
ACETONE: IGNITES ON CONTACT.
ACETYLENE: VIOLENT OXIDATION REACTION.
ALCOHOLS: IGNITES.
ALKALIES: VIOLENT REACTION.
ALUMINUM: VIOLENT REACTION AND POSSIBLE IGNITION.
AMMONIA: INCANDESCENT REACTION.
ANILINE: FIRE AND EXPLOSION HAZARD.
ANTHRACENE: IGNITES ON CONTACT.
ARSENIC: INCANDESCENT REACTION.
BASES: VIOLENT REACTION.
BENZALDEHYDE: VIOLENT REACTION OR IGNITION.
BENZENE: IGNITES ON CONTACT.
BENZYLETHYLANILINE: VIOLENT REACTION OR IGNITION.
BRASS: CORRODES.
BROMINE PENTAFLUORIDE: VIOLENT REACTION OR POSSIBLE IGNITION.
BUTANOL: IGNITES ON CONTACT.
BUTANONE: VIOLENT COMBUSTION.
BUTYRALDEHYDE: VIOLENT REACTION OR IGNITION.
BUTYRIC ACID: IGNITION (ABOVE 100 C).
CAMPHOR: VIOLENT REACTION.
CHLORINE TRIFLUORIDE: VIOLENT OR INCANDESCENT REACTION.
CHROMIUM(II) SULFIDE: IGNITION REACTION.
CLOTH: FIRE AND EXPLOSION HAZARD.

COMBUSTIBLE MATERIALS: FIRE AND EXPLOSION HAZARD.
 COPPER: CORRODES.
 CYCLOHEXANOL: IGNITION.
 DIETHYL ETHER: VIOLENT REACTION.
 DIMETHYLDIOXANE: VIOLENT REACTION OR IGNITION.
 DIMETHYLFORMAMIDE: IGNITION OR VIOLENT REACTION.
 1,3-DIMETHYLHEXAHYDROPYRIMIDINE: EXPLOSIVE REACTION WHICH MAY IGNITE.
 ETHYL ACETATE: VIOLENT REACTION OR IGNITION.
 ETHYL ALCOHOL: IGNITES ON CONTACT.
 ETHYLENE GLYCOL: IGNITES.
 GLYCEROL: VIOLENT IGNITION REACTION.
 GREASE: FIRE AND EXPLOSION HAZARD.
 HEXAMETHYLPHOSPHORIC TRIAMIDE: VIOLENT DECOMPOSITION.
 HYDRAZINE: EXPLOSIVE DECOMPOSITION.
 HYDROCARBONS: IGNITES.
 HYDROGEN SULFIDE: INCANDESCENT REACTION.
 ISOBUTANOL: IGNITES ON CONTACT.
 ISOPROPYL ACETATE: VIOLENT REACTION OR IGNITION.
 ISOPROPYL ALCOHOL: IGNITION.
 LEATHER: ATTACKS.
 LITHIUM + NITROGEN: VIOLENT COMBUSTION.
 METALS: CORRODES.
 METHANOL: POSSIBLE EXPLOSION.
 METHYL DIOXANE: VIOLENT REACTION OR IGNITION.
 NAPHTHALENE: VIOLENT REACTION.
 ORGANIC MATTER: FIRE AND EXPLOSION HAZARD.
 PAPER: FIRE AND EXPLOSION HAZARD.
 PELARGONIC ACID: FIRE AND EXPLOSION HAZARD.
 PENTYL ACETATE: FIRE AND EXPLOSION HAZARD.
 PEROXYFORMIC ACID: VIOLENT DECOMPOSITION AND POSSIBLE EXPLOSION.
 PHOSPHORUS: EXPLOSION.
 PLASTICS: ATTACKS.
 POTASSIUM: REACTS WITH INCANDESCENCE.
 POTASSIUM HEXACYANOFERRATE: IGNITION OR EXPLOSION WHEN HEATED OR GROUND.
 PROPIONALDEHYDE: FIRE AND EXPLOSION HAZARD.
 PYRIDINE: FIRE AND EXPLOSION HAZARD.
 QUINOLINE: FIRE AND EXPLOSION HAZARD.
 REDUCING AGENTS: FIRE AND EXPLOSION HAZARD.
 RUBBER: POSSIBLE IGNITION.
 SELENIUM: VIOLENT REACTION.
 SODIUM: REACTS WITH INCANDESCENCE.
 SODIUM AMIDE: VIOLENT REACTION.
 SULFUR: IGNITES WHEN HEATED.
 THINNER: FIRE AND EXPLOSION HAZARD.
 TURPENTINE: VIOLENT REACTION.
 WOOD: FIRE AND EXPLOSION HAZARD.

DECOMPOSITION:

CHROMIC ACID DECOMPOSES UPON HEATING ABOVE 250 C FORMING TRIVALENT CHROMIUM
 OXIDE(CR₂-O₃) AND OXYGEN WHICH INCREASES THE FIRE HAZARD.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL
 TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

PROTECT AGAINST PHYSICAL DAMAGE. SEPARATE FROM COMBUSTIBLE, ORGANIC, OR OTHER READILY OXIDIZABLE MATERIALS. PROTECT FROM EXCESSIVE MOISTURE TO MINIMIZE RUSTING-OUT OF CONTAINERS. AVOID STORAGE ON WOODEN FLOORS. REMOVE AND DISPOSE OF ANY SPILLAGE OF THIS MATERIAL (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CHROMIUM - REGULATORY LEVEL: 5.0 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D007.

CONDITIONS TO AVOID

AVOID CONTACT WITH OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). AVOID CONTACT WITH EYES AND SKIN; MATERIAL MAY BE POISONOUS OR CORROSIVE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG A HOLDING AREA SUCH AS PIT, POND OR LAGOON TO CONTAIN SPILLED MATERIAL. USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT DISSOLVING IN FIREFIGHTING WATER OR RAIN.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

WATER SPILL:
NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM BICARBONATE.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROCESS ENCLOSURE RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CARCINOGENIC HEXAVALENT CHROMIUM COMPOUNDS:

AT ANY DETECTABLE CONCENTRATION:

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.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 10/02/84 REVISION DATE: 02/25/92

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COBALT MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS05250

CAS#: 7440-48-4 FORMULA: CO

COBALT IS AN ODORLESS, SILVER-GRAY OR BLUISH-WHITE METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

SLIGHT FIRE HAZARD. DUST-AIR MIXTURES MAY CATCH FIRE OR EXPLODE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST MAY CAUSE IRRITATION TO THE NOSE, THROAT AND REDNESS AND SWELLING OF THE SKIN AND EYES. ADDITIONAL EFFECTS MAY INCLUDE ALLERGIC REACTIONS, VOMITING, DIARRHEA, AND DIFFICULTY BREATHING.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT-TERM EXPOSURE, HEADACHE, NAUSEA, VOMITING, STOMACH AND CHEST PAIN, NUMBNESS, COUGHING-UP BLOOD, LOSS OF THE SENSE OF SMELL AND HEARING, LUNG AND HEART DAMAGE. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS05250

7440-48-4

COBALT

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OHS05250

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: COBALT

CAS NUMBER: 7440-48-4
RTECS NUMBER: GF8750000

TRADE NAMES/SYNONYMS:

C.I.77320; COBALT-59; C-363; COBALT ELEMENT; CO; OHS05250

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: CO

MOLECULAR WEIGHT: 58.93

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: COBALT
CAS# 7440-48-4

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

COBALT METAL, DUST, AND FUME (AS CO):

0.05 MG/M3 OSHA TWA

0.05 MG/M3 ACGIH TWA

0.05 MG/M3 NIOSH RECOMMENDED TWA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7027).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: ODORLESS, SILVER-GRAY OR BLUISH-WHITE METAL.

BOILING POINT: 5198 F (2870 C) MELTING POINT: 2723 F (1495 C)

SPECIFIC GRAVITY: 8.92 SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN DILUTE NITRIC ACID, HYDROCHLORIC ACID, SULFURIC ACID.

AUTOIGNITION TEMPERATURE: 698 F (370 C) (LAYER), 1400 F (760 C) (CLOUD)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN METALLIC FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES. FINELY DIVIDED COBALT MAY BE PYROPHORIC IN AIR.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154

EXCEPTIONS: 49 CFR 173.153

TOXICITY

COBALT:

TOXICITY DATA: 6170 MG/KG ORAL-RAT LD50; 750 MG/KG ORAL-RABBIT LDLO; 100 MG/KG

INTRAVENOUS-RABBIT LDLO; 250 MG/KG INTRAPERITONEAL-RAT LDLO; 100 MG/KG INTRAVENOUS-RAT LDLO; 100 MG/KG INTRAPERITONEAL-MOUSE LDLO; 25 MG/KG INTRATRACHEAL-RAT LDLO; TUMORIGENIC DATA (RTECS).
 CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (FOR COBALT METAL POWDER) (IARC GROUP-2B FOR COBALT AND COBALT COMPOUNDS).
 A SIGNIFICANT INCREASE IN THE RISK FOR LUNG CANCER WAS REPORTED AMONG WORKERS IN COBALT PRODUCTION WHO WERE ALSO EXPOSED TO NICKEL AND ARSENIC AND HARD-METAL WORKERS WITH DOCUMENTED EXPOSURE TO COBALT-CONTAINING DUSTS. A SIGNIFICANT INCREASE IN LUNG CANCER RISK WAS SEEN IN PEOPLE EXPOSED FOR MORE THAN 10 YEARS WHOSE EXPOSURE HAD BEGUN MORE THAN 20 YEARS PREVIOUSLY. A NUMBER OF SINGLE CASES OF MALIGNANT TUMORS, MOSTLY SARCOMAS, HAVE BEEN REPORTED AT THE SITE OF ORTHOPAEDIC IMPLANTS CONTAINING COBALT.
 INTRAMUSCULAR AND INTRATHORACIC INJECTIONS OF COBALT METAL POWDER IN RATS PRODUCED SARCOMAS AT THE INJECTION SITE.
 LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
 ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INGESTION.
 TARGET EFFECTS: SENSITIZER- RESPIRATORY, DERMAL. POISONING MAY ALSO AFFECT THE RESPIRATORY, GASTROINTESTINAL, CARDIOVASCULAR, ENDOCRINE AND NERVOUS SYSTEMS.
 AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING RESPIRATORY OR SKIN DISEASE.
 ADDITIONAL DATA: ALCOHOL MAY ENHANCE THE TOXIC EFFECTS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

COBALT:

IRRITANT/SENSITIZER.

20 MG(CO)/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- MAY CAUSE UPPER RESPIRATORY TRACT IRRITATION, RHINITIS, CONJUNCTIVITIS AND TRACHEITIS. SENSITIZATION REACTIONS MAY OCCUR IN PREVIOUSLY EXPOSED INDIVIDUALS. AN OBLITERATIVE BRONCHIOLITIS ADENOMATOSIS HAS BEEN PRODUCED IN GUINEA PIGS INTRATRACHEALLY INJECTED WITH THE DUST AT DOSES OF 50, 25, AND 10 MG. INTRATRACHEAL ADMINISTRATION OF 12.5 MG/KG CAUSED LETHARGY AND DEATH IN RATS IN 15 MINUTES TO 6 HOURS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY CAUSE RESPIRATORY IRRITATION, DISCHARGE FROM RESPIRATORY OR DIGESTIVE MUCOUS MEMBRANES, NASAL OBSTRUCTION, SNEEZING, CLEAR SECRETIONS SOMETIMES CONTAINING BLOOD, AN INTENSE BURNING SENSATION WHEN SWALLOWING, EXERTIONAL DYSPNEA, GASTROINTESTINAL DISTRESS, APPETITE AND WEIGHT LOSS, PERIPHERAL NEURITIS, HEADACHE, WEAKNESS, IRRITABILITY, PARTIAL OR COMPLETE LOSS OF THE SENSE OF SMELL, AUDITORY NERVE PROBLEMS, AND AN INCREASED INCIDENCE OF SPONTANEOUS ABORTIONS IN WOMEN WORKERS AND IN THE WIVES OF MEN WORKERS. SEVERAL CASES OF CARDIOMYOPATHY HAVE BEEN REPORTED IN WORKERS. THE ONSET OF THE DISEASE MAY BEGIN GRADUALLY WITH STEADILY INCREASING CHEST DISCOMFORT AND SHARP PAINS NEAR THE HEART. OTHER SYMPTOMS MAY INCLUDE DRY COUGH, MUCOID SPUTUM, GENERAL MALAISE, DROP IN BLOOD PRESSURE, RIGHT SIDED HEMIPARESIS, SLEEPLESSNESS, AND WEIGHT LOSS. FRAGMENTED MYOCARDIAL FIBERS, VACUOLAR CHANGE, DIFFUSED THICKENING OF THE ENDOCARDIUM AND ABSENCE OF AN INFLAMMATORY REACTION WERE SIGNS OF CARDIOMYOPATHY. STUDIES FROM WORKERS CHRONICALLY EXPOSED TO COBALT IN TUNGSTEN CARBIDE MANUFACTURING OF HARD METAL REVEALED THREE TYPES OF RESPIRATORY DISEASE: AIRWAYS OBSTRUCTION MAY OCCUR FROM SIMPLE IRRITATION AND APPEARS TO BE RELATED TO AN ALLERGIC

RESPONSE. IT HAS BEEN REPORTED TO OCCUR AT A LEVEL OF 0.06 MG/M3 AND IS CHARACTERIZED BY WHEEZING, COUGH, AND SHORTNESS OF BREATH WHILE AT WORK WITH SYMPTOMS IMPROVING WHEN EXPOSURE CEASES. THIS SYNDROME MAY NOT DEVELOP UNTIL 6 TO 18 MONTHS OF EXPOSURE HAS OCCURRED AND IS NOT THOUGHT TO BE PROGRESSIVE. HOWEVER ONCE SENSITIZED A WORKER COULD PROBABLY NOT TOLERATE INHALATION OF EVEN SMALL AMOUNTS; INTERSTITIAL PNEUMONITIS, A SYNDROME SIMILAR TO EXTRINSIC ALLERGIC ALVEOLITIS HAS BEEN REPORTED IN WORKERS. THE SIGNS AND SYMPTOMS ARE COMPATIBLE WITH TRANSIENT PNEUMONITIS. BASAL CRACKLES AND RADIOGRAPHIC ABNORMALITIES OCCUR BUT SYMPTOMS IMPROVE AND RESPIRATORY IMPAIRMENT IS DECREASED OR RESOLVED ONCE THE SUBJECT IS REMOVED FROM EXPOSURE FOR A PERIOD OF TIME; INTERSTITIAL FIBROSIS HAS BEEN OBSERVED TO OCCUR IN WORKERS EXPOSED TO 0.1 TO 0.2 MG/M3 FOR USUALLY 10 YEARS. SYMPTOMS INCLUDED COUGH, SCANTY MUCOID SPUTUM, AND AND SHORTNESS OF BREATH WHICH PROGRESSIVELY WORSENS. TACHYPNEA IS FREQUENT, AND CLUBBING OF THE DIGITS, AND BASAL CRACKLES ARE LATE FEATURES OF THIS CONDITION. PULMONARY FUNCTION IS DECREASED AND DEATH IS USUALLY DUE TO PULMONARY HYPERTENSION AND COR PULMONALE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

COBALT:

IRRITANT/SENSITIZER.

ACUTE EXPOSURE- MAY CAUSE IRRITATION. SENSITIZATION DERMATITIS MAY OCCUR IN PERSONS WHO HAVE BEEN PREVIOUSLY EXPOSED. BOTH URTICARIAL ERUPTIONS AND ERYTHEMATOUS PAPULAR TYPES HAVE BEEN DESCRIBED AND USUALLY OCCUR IN SKIN AREAS SUBJECTED TO FRICTION, SUCH AS THE ELBOW FLEXURES, ANKLES, AND NECK. CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY LEAD TO SENSITIZATION DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

COBALT:

IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION. WORKERS IN THE COBALT-CEMENTED TUNGSTEN INDUSTRY HAVE NOT EXPERIENCED EYE IRRITATION AT CONCENTRATIONS BELOW 1 MG/M3.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

COBALT:

ACUTE EXPOSURE- VOMITING, DIARRHEA, AND A SENSATION OF HOTNESS MAY OCCUR AFTER THE INGESTION OF LARGE AMOUNTS.

CHRONIC EXPOSURE- CARDIOMYOPATHY HAS BEEN CAUSED BY EXCESSIVE INTAKE OF COBALT. SIGNS AND SYMPTOMS OF THIS ILLNESS INCLUDED GASTROINTESTINAL DISTURBANCES WITH NAUSEA, VOMITING AND DIARRHEA, SHORTNESS OF BREATH, DRY AND PERSISTENT COUGH, THORACIC AND RIGHT UPPER QUADRANT ABDOMINAL PAIN, ANKLE EDEMA, CYANOSIS, LOWERED BLOOD PRESSURE, HEART ENLARGEMENT, PERICARDIAL EFFUSION, RAPID HEART RATE, ELECTROCARDIOGRAPHIC ABNORMALITIES AND DEATH. SEQUELA FOLLOWING THIS ILLNESS INCLUDED RECURRENT CHRONIC HEART FAILURE, AND NEUROLOGIC AND MENTAL DETERIORATION. THERAPEUTIC ADMINISTRATION HAS CAUSED NAUSEA, VOMITING, SKIN RASH, TINNITUS, NERVE DEAFNESS, THYROID HYPERPLASIA, MYXEDEMA, POLYCYTHEMIA, CONGESTIVE HEART FAILURE, AND DEATH. ADMINISTRATION TO HUMANS AT 1 MG DAILY FOR THREE DAYS RESULTED IN PROLONGED TIME FOR BLOOD CLOT FORMATION. DEGENERATIVE CHANGES HAVE OCCURRED IN THE LIVER, KIDNEYS, AND PANCREAS OF ANIMALS. ADMINISTRATION IN DRINKING WATER PRODUCED ERYTHROPOIETIC EFFECTS, IMMUNOSUPPRESSION, AND INHIBITED REFLEX LEARNING IN RATS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

POISONING FROM COBALT COMPOUNDS:

GIVE CALCIUM DISODIUM EDETATE, AVAILABLE AS 5 ML AMPULES OF A 20% SOLUTION. GIVE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD, TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.

FOR INTRAMUSCULAR ADMINISTRATION, GIVE 20% SOLUTION (200 MG/ML), 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE.

FOR SEVERE INTOXICATIONS, SOME EXPERTS URGE SIMULTANEOUS ADMINISTRATION OF DIMERCAPROL DURING THE FIRST 48 HOURS OF TREATMENT (DREISBACH HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

FINELY DIVIDED COBALT MAY REACT PYROPHORICALLY IN AIR.

INCOMPATIBILITIES:

COBALT:

ACETYLENE: INCANDESCENT REACTION.

AMMONIUM NITRATE: VIOLENT OR EXPLOSIVE REACTION.

BROMINE PENTAFLUORIDE: VIOLENT REACTION WITH POSSIBLE IGNITION.
BROMINE TETRAFLUORIDE: VIOLENT REACTION WITH POSSIBLE IGNITION.
HYDRAZINIUM NITRATE: POSSIBLE EXPLOSION ABOVE 70 C.
NITRYL FLUORIDE: INCANDESCENT REACTION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
1,3,4,7-TETRAMETHYLISOINDOLE: POSSIBLE EXPLOSION ON HEATING.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF COBALT.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

***STORAGE**

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

COBALT METAL, DUST, AND FUME (AS CO):

FOR DUST OR MIST:

0.5 MG(CO)/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE RESPIRATORS.

1 MG(CO)/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND QUARTER-MASK RESPIRATORS.

2.5 MG(CO)/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.

FOR DUST, MIST OR FUME:

1 MG(CO)/M3- ANY DUST, MIST, AND FUME RESPIRATOR.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

2.5 MG(CO)/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

5 MG(CO)/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

20 MG(CO)/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS

SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A
FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE
EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN
AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 11/30/84 REVISION DATE: 03/19/92

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COPPER MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS05430

CAS#: 7440-50-8 FORMULA: CU

COPPER IS A REDDISH METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

SLIGHT FIRE HAZARD. DUST-AIR MIXTURES MAY CATCH FIRE OR EXPLODE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST OF COPPER MAY CAUSE IRRITATION TO NOSE, EYES WITH REDNESS AND PAIN, THROAT AND SKIN. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, NAUSEA, VOMITING, A METALLIC TASTE, HEAD CONGESTION, CHILLS, FEVER, COUGHING, MUSCLE ACHES, AND EYE DAMAGE.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, MAY CAUSE REDNESS AND SWELLING OF THE EYE AND GREEN DISCOLORATION OF HAIR, TEETH AND SKIN.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS05430

7440-50-8

COPPER

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OHS05430

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-50-8
RTECS NUMBER: GL5325000

SUBSTANCE: COPPER

TRADE NAMES/SYNONYMS:

ALLBRI NATURAL COPPER; C.I. PIGMENT METAL 2; COPPER DUST; COPPER FUME;
COPPER-AIRBORNE; COPPER-BRONZE; COPPER-MILLED; COPPER SLAG-AIRBORNE;
COPPER SLAG-MILLED; GOLD BRONZE;
ELECTROLYTIC TOUGH PITCH (EASTERN ROLLING MILLS, INC.); C.I. 77400;
METAL WROUGHT PRODUCTS (WELDALOY PRODUCTS COMPANY); CU; OHS05430

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: CU

MOLECULAR WEIGHT: 63.5

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: COPPER
CAS# 7440-50-8

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

COPPER AND COMPOUNDS (AS CU):

0.1 MG/M3 OSHA TWA (FUME); 1 MG/M3 OSHA TWA (DUST AND MIST)
0.2 MG/M3 ACGIH TWA (FUME); 1 MG/M3 ACGIH TWA (DUST AND MIST)
0.1 MG/M3 NIOSH RECOMMENDED TWA (FUME);
1 MG/M3 NIOSH RECOMMENDED TWA (DUST AND MIST)
0.1 MG/M3 DFG MAK TWA (FUME) (FINE DUST);
0.2 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT (FUME)
1 MG/M3 DFG MAK TWA (DUST AND MIST) (TOTAL DUST);
2 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT (DUST AND MIST)

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. III # 7029).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

COPPER:

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: REDDISH, DUCTILE, MALLEABLE, LUSTROUS METAL OR CUBIC CRYSTALS.

BOILING POINT: 4653 F (2567 C) MELTING POINT: 1946 F (1083 C)

SPECIFIC GRAVITY: 8.92 VAPOR PRESSURE: 1 MMHG @ 1628 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN NITRIC ACID, SULFURIC ACID (HOT),
HYDROGEN BROMIDE (HOT); SLIGHTLY SOLUBLE IN HYDROCHLORIC ACID, AMMONIUM
HYDROXIDE

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE
FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FLASH POINT: FLAMMABLE (DUST) AUTOIGNITION TEMP.: 1292 F (700 C)

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE
METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA
FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE
UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM
AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5,
GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING
MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

COPPER:

TOXICITY DATA: 120 UG/KG ORAL-HUMAN TDLO; 3500 UG/KG INTRAPERITONEAL-MOUSE LD50; REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: IRRITANT- INHALATION, EYE.

ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.

TARGET EFFECTS: POISONING MAY AFFECT THE LIVER AND KIDNEYS.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING RESPIRATORY, LIVER, KIDNEY, SKIN, AND BLOOD DISORDERS OR WILSON'S DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

COPPER:

IRRITANT.

ACUTE EXPOSURE- POWDERED DUST MAY CAUSE IRRITATION OF THE UPPER RESPIRATORY TRACT AND ULCERATION AND PERFORATION OF THE NASAL SEPTUM. A FEELING OF ILLNESS SIMILAR TO THE COMMON COLD HAS BEEN REPORTED WITH SYMPTOMS OF CHILLS AND STUFFINESS OF THE HEAD. WORKERS EXPOSED TO COPPER DUST IN CONCENTRATIONS OF 0.075 TO 0.120 MG/M3 COMPLAINED OF MILD NASAL DISCOMFORT. EXPOSURE TO COPPER FUME MAY CAUSE IRRITATION TO THE MUCOUS MEMBRANES. FRESHLY FORMED COPPER FUMES MAY CAUSE METAL FUME FEVER. SYMPTOMS MAY INCLUDE A SWEET, METALLIC, OR FOUL TASTE IN THE MOUTH, DRY THROAT, COUGHING, FEVER, CHILLS, MUSCLE ACHES, WEAKNESS, LASSITUDE, NAUSEA, RARELY VOMITING, MILD TO SEVERE HEADACHES, AND SOMETIMES EXAGGERATED MENTAL ACTIVITY. WORKERS EXPOSED TO CONCENTRATIONS OF 1 TO 3 MG/M3 EXPERIENCED AN ALTERED TASTE RESPONSE BUT NO NAUSEA.

CHRONIC EXPOSURE- PROLONGED INDUSTRIAL EXPOSURE MAY CAUSE A GREEN DISCOLORATION OF THE SKIN, HAIR AND TEETH. WELDERS EXPOSED TO COPPER FUME EXPERIENCED ATROPHIC RHINITIS, METALLIC TASTE, RUNNY NOSE, AND MUCOSAL IRRITATION OF THE MOUTH AND EYES. IT IS INCONCLUSIVE AS TO WHETHER PROLONGED EXPOSURE HAS ANY AFFECT ON THE NERVOUS SYSTEM. A SMALL NUMBER OF STUDIES SUGGEST AN AFFINITY OF COPPER FOR THE SYMPATHETIC SYSTEM, HOWEVER, THERE IS NO PROOF THAT CHRONIC POISONING WILL AFFECT EITHER THE CENTRAL OR PERIPHERAL NERVOUS SYSTEM.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

COPPER:

ACUTE EXPOSURE- MAY BE IRRITATING AND CAUSE KERATINIZATION. ALLERGIC DERMATITIS ALTHOUGH RARE, HAS BEEN REPORTED. DERMAL ABSORPTION IS NEGLIGIBLE THROUGH INTACT SKIN.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE IRRITATION AND DISCOLORATION OF THE SKIN.

FIRST AID- 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.

EYE CONTACT:

COPPER:

IRRITANT.

ACUTE EXPOSURE- THE DUST MAY CAUSE IRRITATION WITH REDNESS AND PAIN. COPPER PARTICLES IN THE EYE MAY RESULT IN A FOREIGN BODY RESPONSE WITH CHARACTERISTIC DISCOLORATION OF OCULAR TISSUE, DEGENERATION AND/OR DETACHMENT OF THE RETINA, AND ATROPHY OF THE GLOBE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

COPPER:

ACUTE EXPOSURE- 120 UG/KG INGESTED BY A HUMAN CAUSED GASTROINTESTINAL DISORDER WITH NAUSEA AND VOMITING.

CHRONIC EXPOSURE- COPPER IS AN ESSENTIAL ELEMENT AND IS FOUND IN MOST HUMAN DIETS IN MINUTE AMOUNTS. PROLONGED INGESTION THROUGH THE DIET IS NOT KNOWN TO CAUSE TOXIC EFFECTS EXCEPT IN PEOPLE WITH A RECESSIVE GENE DISORDER TERMED WILSON'S DISEASE WHICH CAUSES AN ABNORMALLY HIGH ABSORPTION, RETENTION, AND STORAGE OF COPPER BY THE BODY. THIS DISEASE MAY CAUSE A DYSFUNCTION OF AND STRUCTURAL DAMAGE TO THE LIVER, CENTRAL NERVOUS SYSTEM, KIDNEY, BONES AND EYES. THE DISEASE IS USUALLY PROGRESSIVE AND MAY BE FATAL IF LEFT UNTREATED. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID: IF PERSON IS CONSCIOUS, GIVE LARGE AMOUNTS OF WATER IMMEDIATELY. REMOVE BY EMESIS OR GASTRIC LAVAGE. DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT OR DRINK ANYTHING. GIVE ACTIVATED CHARCOAL. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. MAINTAIN AIRWAY AND BLOOD PRESSURE. GET MEDICAL ATTENTION. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.) LAVAGE OR OXYGEN MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

COPPER POISONING:

GIVE CALCIUM DISODIUM EDTATE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2

HOUR PERIOD TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD NOT BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR. INTRAVENOUS ADMINISTRATION IS CONTRAINDICATED IN THE PRESENCE OF ELEVATED CEREBROSPINAL FLUID PRESSURE. PENICILLAMINE IS ALSO EFFECTIVE IN COPPER POISONING. GIVE UP TO 100 MG/KG/DAY (MAXIMUM 1 G/DAY) DIVIDED INTO 4 DOSES FOR NO LONGER THAN 1 WEEK. IF A LONGER ADMINISTRATION PERIOD IS WARRANTED, DOSAGE SHOULD NOT EXCEED 40 MG/KG/DAY. GIVE THE DRUG ORALLY, HALF AN HOUR BEFORE MEALS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

 REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

COPPER:

ACETYLENE: FORMS EXPLOSIVE COPPER ACETYLIDE.
 ACETYLENIC COMPOUNDS: FORMATION OF EXPLOSIVE ACETYLIDES.
 ALUMINUM + SULFUR: POSSIBLE EXPLOSION.
 AMMONIUM NITRATE: VIOLENT OR EXPLOSIVE REACTION.
 BARIUM BROMATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 BARIUM CHLORATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 BARIUM IODATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 1-BROMO-2-PROPYLENE: FORMATION OF EXPLOSIVE COMPOUND.
 CALCIUM BROMATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 CALCIUM CHLORATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 CALCIUM IODATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 CHLORATES: EXPLOSIVE REACTION.
 CHLORINE: IGNITION REACTION.
 CHLORINE + OXYGEN DIFLUORIDE: EXPLOSIVE REACTION AT -10 C.
 CHLORINE TRIFLUORIDE: INTENSE REACTION WITH POSSIBLE IGNITION.
 DIMETHYL SULFOXIDE + TRICHLOROACETIC ACID: POSSIBLE EXPLOSION.
 ETHYLENE OXIDE: POSSIBLE EXPLOSION.
 FLUORINE: IGNITION REACTION.
 HYDRAZINIUM NITRATE: IGNITION REACTION.
 HYDRAZOIC ACID: POSSIBLE EXPLOSION.
 HYDROGEN PEROXIDE: VIOLENT DECOMPOSITION.
 HYDROGEN SULFIDE: INTENSE EXOTHERMIC REACTION WITH POSSIBLE IGNITION.
 LEAD AZIDE: FORMS EXPLOSIVE COPPER AZIDE.
 MAGNESIUM BROMATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 MAGNESIUM CHLORATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 MAGNESIUM IODATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 PHOSPHORUS: INCANDESCENT REACTION.
 POTASSIUM BROMATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 POTASSIUM CHLORATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 POTASSIUM DIOXIDE: INCANDESCENT REACTION.
 POTASSIUM IODATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
 SODIUM AZIDE: FORMS EXPLOSIVE COMPOUND.
 SODIUM BROMATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.

SODIUM CHLORATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
SODIUM IODATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
SODIUM PEROXIDE: INCANDESCENT REACTION.
SULFUR + CHLORATES: SPONTANEOUS EXPLOSION.
SULFURIC ACID: INTENSE REACTION.
ZINC BROMATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
ZINC CHLORATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.
ZINC IODATE: EXPLOSIVE REACTION BY HEAT, IMPACT OR FRICTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT MATERIAL FROM DISSOLVING IN FIRE EXTINGUISHING WATER OR RAIN.

WATER SPILL:

USE ACTIVATED CARBON TO ABSORB SPILLED SUBSTANCE THAT IS DISSOLVED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL SPILLS, WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, WET DOWN WITH WATER AND DIKE FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

REPORTABLE QUANTITY (RQ): 5000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

COPPER (AS CU):

FOR FUME:

1 MG/M3- ANY DUST, MIST, AND FUME RESPIRATOR.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

2.5 MG/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

5 MG/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

200 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/03/84 REVISION DATE: 12/23/91

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M-CRESOL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS13080

CAS#: 108-39-4 FORMULA: C7H8O

M-CRESOL IS A COLORLESS TO YELLOW LIQUID WITH AN UNUSUAL ODOR. YOU CAN SMELL IT AT 5 PARTS PER MILLION.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 187 F (86 C). SLIGHT FIRE HAZARD. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, SKIN, EYES, MOUTH, AND STOMACH. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, ALLERGIC REACTIONS, HEADACHE, RINGING IN THE EARS, NAUSEA, VOMITING, DIARRHEA, STOMACH PAIN, DIFFICULTY BREATHING, VISION CHANGES, RAPID PULSE, LUNG CONGESTION, AND UNCONSCIOUSNESS. DEATH MAY BE POSSIBLE.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN, DROOLING, SKIN RASH, DIFFICULTY SWALLOWING, MUSCLE SPASMS, TWITCHING, HIGH BLOOD PRESSURE, LIVER, HEART, AND KIDNEY EFFECTS, MENTAL CHANGES, AND TUMORS MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS13080

108-39-4

M-CRESOL

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OHS13080

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 108-39-4
RTECS NUMBER: G06125000

SUBSTANCE: M-CRESOL

TRADE NAMES/SYNONYMS:

3-CRESOL; M-CRESYLIC ACID; 1-HYDROXY-3-METHYLBENZENE; M-HYDROXYTOLUENE;
M-METHYLPHENOL; 3-METHYLPHENOL; M-OXYTOLUENE; M-KRESOL; 3-CRESOLE;
1-HYDROXY-3-METHYL BENZENE; M-TOLUOL; 3-HYDROXYTOLUENE; UN 2076; BP-223;
U052; OHS13080

CHEMICAL FAMILY:
HYDROXYL, AROMATIC

MOLECULAR FORMULA: C7-H8-O

MOLECULAR WEIGHT: 108.15

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=1 REACTIVITY=0 PERSISTENCE=2
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=1 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: M-CRESOL
CAS# 108-39-4

PERCENT: >99

OTHER CONTAMINANTS: O-CRESOL, P-CRESOL

EXPOSURE LIMITS:

CRESOL (ALL ISOMERS):

5 PPM (22 MG/M3) OSHA TWA (SKIN)
5 PPM (22 MG/M3) ACGIH TWA (SKIN)
2.3 PPM (10 MG/M3) NIOSH RECOMMENDED TWA
5 PPM (22 MG/M3) DFG MAK TWA (SKIN);
10 PPM (44 MG/M3) DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; ACETONE; GAS CHROMATOGRAPHY WITH FLAME
IONIZATION DETECTION; (NIOSH VOL. III # 2001).

1000 POUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS TO YELLOW LIQUID WITH A PHENOLIC ODOR.

BOILING POINT: 397 F (203 C) MELTING POINT: 52 F (11 C)

SPECIFIC GRAVITY: 1.0 VAPOR PRESSURE: 1.0 MMHG @ 52 C

PH: ACIDIC IN SOLUTION SOLUBILITY IN WATER: SLIGHT ODOR THRESHOLD: 5 PPM

VAPOR DENSITY: 3.7

SOLVENT SOLUBILITY: ALCOHOL, BENZENE, ETHER, ACETONE, VEGETABLE OILS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FLASH POINT: 187 F (86 C) (CC) LOWER EXPLOSIVE LIMIT: 1.1% @ 302 F

AUTOIGNITION TEMP.: 1038 F (559 C) FLAMMABILITY CLASS(OSHA): IIIA

FIREFIGHTING MEDIA:

DRY CHEMICAL, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

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 (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 55).

USE FLOODING AMOUNTS OF WATER AS A FOG; SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.245
EXCEPTIONS: 49 CFR 173.244

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
CRESOLS-UN 2076

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

M-CRESOL:
IRRITATION DATA: 517 MG/24 HOURS SKIN-RABBIT SEVERE; 103 MG EYE-RABBIT SEVERE.
TOXICITY DATA: 2050 MG/KG SKIN-RABBIT LD50; 1100 MG/KG SKIN-RAT LD50;
242 MG/KG ORAL-RAT LD50; 828 MG/KG ORAL-MOUSE LD50; 1400 MG/KG ORAL-RABBIT
LDLO; 900 MG/KG SUBCUTANEOUS-RAT LDLO; 450 MG/KG SUBCUTANEOUS-MOUSE LDLO;
500 MG/KG SUBCUTANEOUS-RABBIT LDLO; 180 MG/KG SUBCUTANEOUS-CAT LDLO;
300 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 280 MG/KG INTRAVENOUS-RABBIT LDLO;
150 MG/KG INTRAVENOUS-DOG LDLO; 168 MG/KG INTRAPERITONEAL-MOUSE LD50;
100 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; 600 MG/KG UNREPORTED-MOUSE LD50;
MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA
(RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, AND EYES.
ACUTE TOXICITY LEVEL: TOXIC BY INGESTION AND SLIGHTLY TOXIC BY DERMAL
ABSORPTION.
TARGET EFFECTS: SENSITIZER- SKIN. CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING
MAY AFFECT THE LIVER AND KIDNEYS AND THE RESPIRATORY AND CARDIOVASCULAR

SYSTEMS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

M-CRESOL:

CORROSIVE/NARCOTIC. 250 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- HUMANS EXPOSED EXPERIMENTALLY TO 6 MG/M3 OF THE ORTHO ISOMER REPORTED NASAL CONSTRICTION, THROAT IRRITATION, RESPIRATORY MUCOSA DRYNESS AND THE SENSATION OF AN UNSPECIFIED TASTE. HOWEVER, INHALATION IS NOT USUALLY AN ACUTE HAZARD DUE TO THE LOW VAPOR PRESSURE AND THE DISAGREEABLE ODOR WHICH IS DETECTABLE EVEN AT LOW CONCENTRATIONS. EXPOSURE TO AEROSOLS OR TO VAPORS PRODUCED BY HIGH TEMPERATURE PROCESSES MAY CAUSE SEVERE RESPIRATORY TRACT IRRITATION AND SYSTEMIC ABSORPTION. THE SYMPTOMS, POSSIBLY DELAYED 20-30 MINUTES, MAY INCLUDE HEADACHE, DIZZINESS, VOMITING, TINNITUS, DIMNESS OF VISION, RAPID, IRREGULAR RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, RESPIRATORY FAILURE, AND DEATH ARE POSSIBLE. PATHOLOGIC FINDINGS AS DETAILED IN ACUTE SKIN EXPOSURE MAY BE FOUND.

CHRONIC EXPOSURE- CHRONIC INHALATION OF VAPORS MAY RESULT IN RESPIRATORY TRACT IRRITATION AND DISTURBANCES OF THE NERVOUS, GASTROINTESTINAL AND VASCULAR SYSTEMS. SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, FAINTING, FACIAL MUSCLE SPASMS, TREMORS, MENTAL DISTURBANCES, DIFFICULTY IN SWALLOWING, SALIVATION, NAUSEA, VOMITING, DIARRHEA, ANOREXIA, HYPERTENSION, SLIGHTLY ENLARGED HEART, AND SKIN RASH. LIVER AND KIDNEY DAMAGE ARE POSSIBLE AND, IF SEVERE, MAY RESULT IN DEATH.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

M-CRESOL:

CORROSIVE/NARCOTIC/SENSITIZER.

ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION. PRICKLING AND INTENSE BURNING MAY OCCUR AFTER A FEW MINUTES FOLLOWED BY LOCAL ANESTHESIA. AFFECTED TISSUES MAY INITIALLY SHOW WHITE DISCOLORATION, WRINKLING, AND SOFTENING, WHICH SUBSEQUENTLY MAY BECOME GANGRENOUS. SENSITIZATION DERMATITIS MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS. IT IS READILY ABSORBED THROUGH THE SKIN TO CAUSE SYSTEMIC EFFECTS WHICH MAY BE DELAYED 20-30 MINUTES. THE SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, VOMITING, TINNITUS, DIMNESS OF VISION, IRREGULAR, RAPID RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, AND DEATH MAY OCCUR. PATHOLOGICAL FINDINGS HAVE INCLUDED PULMONARY HYPEREMIA, EMPHYSEMA, AND EDEMA; BRONCHOPNEUMONIA WITH PETECHIAL HEMORRHAGES IN THE PLEURA; AND NODULAR PNEUMONIA. KIDNEYS HAVE SHOWN PARENCHYMATOUS AND HEMORRHAGIC NEPHRITIS AND TUBULE DAMAGE. THE LIVER HAS

SHOWN CONGESTION WITH PALLOR AND NECROSIS OF HEPATIC CELLS. DEGENERATED MYOCARDIUM AND SMALL HEMORRHAGES IN THE EPICARDIUM AND ENDOCARDIUM HAVE BEEN SEEN. CONGESTION IN THE BRAIN AND DAMAGE TO THE PANCREAS AND SPLEEN HAVE ALSO BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO LOW CONCENTRATIONS MAY CAUSE DERMATITIS AND EVEN VERY DILUTE SOLUTIONS MAY CAUSE SENSITIZATION. RARELY, PROLONGED CONTACT MAY RESULT IN A PIGMENTORY DISORDER CALLED OCHRONOSIS, WHICH IS A DARKENING OF THE CONJUNCTIVA, SKIN AND CARTILAGE OF THE NOSE AND EARS. REPEATED ABSORPTION MAY RESULT IN DISTURBANCES OF THE NERVOUS, GASTROINTESTINAL AND VASCULAR SYSTEMS. SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, FAINTING, FACIAL MUSCLE SPASMS, TREMORS, MENTAL DISTURBANCES, DIFFICULTY IN SWALLOWING, SALIVATION, NAUSEA, VOMITING, DIARRHEA, ANOREXIA, HYPERTENSION, SLIGHTLY ENLARGED HEART, AND SKIN RASH. LIVER AND KIDNEY DAMAGE ARE POSSIBLE AND, IF SEVERE, MAY RESULT IN DEATH. AS EVALUATED BY RTECS, ADMINISTRATION TO MICE BY SKIN APPLICATION RESULTED IN NEOPLASTIC TUMORS ON SKIN OR APPENDAGES.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

M-CRESOL:

CORROSIVE.

ACUTE EXPOSURE- CRESOL SOLUTIONS SPLASHED IN THE EYE MAY CAUSE PERMANENT CORNEAL OPACIFICATION AND VASCULARIZATION, HYPERMIA, AND SWELLING OF THE CONJUNCTIVA. INJURY FROM CRESOLS DEPENDS ON THE CONCENTRATION AND THE DURATION OF CONTACT.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

M-CRESOL:

CORROSIVE/NARCOTIC/TOXIC.

ACUTE EXPOSURE- MAY CAUSE SEVERE MUCOSAL IRRITATION, INTENSE BURNING PAIN IN THE MOUTH AND THROAT FOLLOWED BY MARKED ABDOMINAL PAIN AND DISTRESS, NAUSEA, VOMITING, AND DIARRHEA. IT IS READILY ABSORBED BY THE GASTROINTESTINAL TRACT TO CAUSE SYSTEMIC EFFECTS WHICH MAY BE DELAYED 20-30 MINUTES. THE SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, TINNITUS, DIMNESS OF VISION, IRREGULAR, RAPID RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. OTHER POSSIBLE EFFECTS INCLUDE PULMONARY EDEMA, PNEUMONIA, KIDNEY CONGESTION AND FAILURE, PANCREATITIS, AND DAMAGE TO THE LIVER AND SPLEEN. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, AND DEATH MAY OCCUR. PATHOLOGIC FINDINGS AS DETAILED IN ACUTE SKIN EXPOSURE MAY BE FOUND.

CHRONIC EXPOSURE- NO SPECIFIC DATA AVAILABLE. MAY CAUSE SYSTEMIC SYMPTOMS AS DETAILED IN CHRONIC INHALATION.

FIRST AID- IN THE ABSENCE OF CORROSIVE INJURY, REMOVE POISON BY IPECAC EMESIS. ACTIVATED CHARCOAL IS ALSO USEFUL. FOLLOW WITH 240 ML OF MILK. GASTRIC LAVAGE AND EMESIS ARE CONTRAINDICATED IN THE PRESENCE OF ESOPHAGEAL INJURY (DREISBACH, HANDBOOK OF POISONING, 12TH EDITION). GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

M-CRESOL:

ACIDS (STRONG): VIOLENT REACTION.

CHLOROSULFONIC ACID: INCREASE IN TEMPERATURE AND PRESSURE IN A CLOSED CONTAINER.

METALS (ACTIVE): VIOLENT REACTION.

NITRIC ACID: INCREASE IN TEMPERATURE AND PRESSURE IN A CLOSED CONTAINER.

OLEUM: INCREASE IN TEMPERATURE AND PRESSURE IN A CLOSED CONTAINER.

OXIDANTS: VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

PROTECT AGAINST PHYSICAL DAMAGE. STORE IN A COOL, DRY, WELL VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE. OUTSIDE OR DETACHED STORAGE IS PREFERRED. SEPARATE FROM OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U052.

M-CRESOL - REGULATORY LEVEL: 200.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D024.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

AIR SPILL:

KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER USED TO KNOCK DOWN VAPORS MAY BECOME CORROSIVE OR TOXIC AND SHOULD BE CONTAINED PROPERLY FOR LATER DISPOSAL.

WATER SPILL:

USE ACTIVATED CARBON TO ABSORB SPILLED SUBSTANCE THAT IS DISSOLVED.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

TRAP SPILLED MATERIAL AT BOTTOM IN DEEP WATER POCKETS, EXCAVATED HOLDING AREAS OR WITHIN SAND BAG BARRIERS.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINERS AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF

THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CRESOL (ALL ISOMERS):

23 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST AND MIST FILTER.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

57.5 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST AND MIST FILTER.

115 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
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.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

250 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A 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.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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O-CRESOL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS16960

CAS#: 95-48-7 FORMULA: C7H8O

O-CRESOL IS A COLORLESS LIQUID OR SOLID WITH AN ODOR. IF YOU CAN SMELL IT YOU MAY BE EXCEEDING THE EXPOSURE LIMIT.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 178 F (81 C). MODERATE FIRE HAZARD. VAPOR-AIR MIXTURES MAY BE EXPLOSIVE. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, STOMACH, SKIN, AND EYES WITH DAMAGE, AND ALLERGIC REACTIONS. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, VISION AND HEARING EFFECTS, HEADACHE, STOMACH PAIN, NAUSEA, VOMITING, DIARRHEA, LUNG CONGESTION, LIVER AND SPLEEN DAMAGE, KIDNEY FAILURE, WEAK PULSE, BLUISH COLOR OF THE SKIN, LIPS, AND FINGERNAILS, COLDNESS, FAINTING, UNCONSCIOUSNESS, HEART FAILURE, AND POSSIBLE DEATH BY INHALATION AND SKIN CONTACT.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, SKIN RASH AND DISCOLORATION, TWITCHING, DIFFICULTY IN SWALLOWING, DROOLING, AND NERVE, BLOOD VESSEL, HEART EFFECTS, AND LIVER AND KIDNEY DAMAGE MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS16960

95-48-7

O-CRESOL

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OHS16960

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 95-48-7
RTECS NUMBER: G06300000

SUBSTANCE: O-CRESOL

TRADE NAMES/SYNONYMS:

O-CRESYLIC ACID; O-HYDROXYTOLUENE; 2-CRESOL; 1-HYDROXY-2-METHYL BENZENE;
2-HYDROXYTOLUENE; 2-METHYLPHENOL; O-METHYLPHENOL; ORTHO-CRESOL;
O-OXYTOLUENE; O-TOLUOL; O-METHYL PHENOLOL; UN 2076; C-536; U052; C7H8O;
OHS16960

CHEMICAL FAMILY:
HYDROXYL, AROMATIC

MOLECULAR FORMULA: C7-H8-O

MOLECULAR WEIGHT: 108.45

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=2 REACTIVITY=0 PERSISTENCE=2
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=2 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: O-CRESOL PERCENT: >99.0
CAS# 95-48-7

OTHER CONTAMINANTS: META- AND PARA- ISOMERS MAY BE PRESENT.

EXPOSURE LIMITS:

CRESOL (ALL ISOMERS):

5 PPM (22 MG/M3) OSHA TWA (SKIN)
5 PPM (22 MG/M3) ACGIH TWA (SKIN)
2.3 PPM (10 MG/M3) NIOSH RECOMMENDED TWA
5 PPM (22 MG/M3) DFG MAK TWA (SKIN);
10 PPM (44 MG/M3) DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; ACETONE; GAS CHROMATOGRAPHY WITH FLAME
IONIZATION DETECTION; (NIOSH VOL. III # 2001).

1000 POUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

O-CRESOL:

1000/10,000 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
 1000 POUNDS SARA SECTION 304 REPORTABLE QUANTITY
 1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

 PHYSICAL DATA

DESCRIPTION: COLORLESS LIQUID OR CRYSTALS, DARKENING ON EXPOSURE TO AIR
 OR LIGHT, WITH A PHENOLIC ODOR. BOILING POINT: 375 F (191 C)
 MELTING POINT: 87 F (31 C) SPECIFIC GRAVITY: 1.0273
 VAPOR PRESSURE: 0.25 MMHG @ 25 C SOLUBILITY IN WATER: 2.5%
 ODOR THRESHOLD: 5 PPM VAPOR DENSITY: 3.7
 SOLVENT SOLUBILITY: ETHANOL, ETHER, CHLOROFORM, BENZENE

 FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
 MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.
 VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.
 VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
 OF IGNITION AND FLASH BACK.
 FLASH POINT: 178 F (81 C) (CC) LOWER EXPLOSIVE LIMIT: 1.4 @ 300 F
 AUTOIGNITION TEMP.: 1110 F (599 C) FLAMMABILITY CLASS(OSHA): IIIA
 FIREFIGHTING MEDIA:
 DRY CHEMICAL, WATER SPRAY OR REGULAR FOAM
 (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).
 FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
 (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).
 FIREFIGHTING:
 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 (1990 EMERGENCY RESPONSE
 GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 55).
 USE FLOODING AMOUNTS OF WATER AS A FOG; SOLID STREAMS MAY NOT BE EFFECTIVE.
 COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A
 DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND.
 WATER MAY BE USED TO BLANKET FIRE (NFPA 325M FIRE HAZARD PROPERTIES OF
 FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1984)

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.245
EXCEPTIONS: 49 CFR 173.244

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
CRESOLS-UN 2076

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

O-CRESOL:
IRRITATION DATA: 524 MG/24 HOURS SKIN-RABBIT SEVERE; 105 MG EYE-RABBIT SEVERE.
TOXICITY DATA: 179 MG/M3/2 HOURS MOUSE-INHALATION LC50; 890 MG/KG SKIN-RABBIT
LD50; 620 MG/KG SKIN-RAT LD50; 121 MG/KG ORAL-RAT LD50; 344 MG/KG ORAL-MOUSE
LD50; 970 MG/KG ORAL-RABBIT LDLO; 65 MG/KG SUBCUTANEOUS-RAT LDLO; 410 MG/KG
SUBCUTANEOUS-MOUSE LDLO; 55 MG/KG SUBCUTANEOUS-CAT LDLO; 450 MG/KG

SUBCUTANEOUS-RABBIT LDLO; 35 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 80 MG/KG INTRAVENOUS-DOG LDLO; 180 MG/KG INTRAVENOUS-RABBIT LDLO; 720 INTRAPERITONEAL-GUINEA PIG LDLO; 200 MG/KG INTRAPERITONEAL-MOUSE LDLO; MUTAGENIC DATA (RTECS); TUMORIGENIC DATA (RTECS).
 CARCINOGEN STATUS: NONE.
 LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
 ACUTE TOXICITY LEVEL: HIGHLY TOXIC BY INHALATION; TOXIC BY DERMAL ABSORPTION AND INGESTION.
 TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT, SENSITIZER-DERMAL.
 POISONING MAY AFFECT THE LIVER, KIDNEYS, AND THE RESPIRATORY AND CARDIOVASCULAR SYSTEMS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

O-CRESOL:

CORROSIVE/NARCOTIC/HIGHLY TOXIC.

ACUTE EXPOSURE- HUMANS EXPOSED EXPERIMENTALLY TO 6 MG/M3 REPORTED NASAL CONSTRICTION, THROAT IRRITATION, RESPIRATORY MUCOSA DRYNESS, AND THE SENSATION OF AN UNSPECIFIED TASTE. HOWEVER, INHALATION IS NOT USUALLY AN ACUTE HAZARD DUE TO THE LOW VAPOR PRESSURE AND THE DISAGREEABLE ODOR WHICH IS DETECTABLE EVEN AT LOW CONCENTRATIONS. EXPOSURE TO AEROSOLS OR TO VAPORS PRODUCED BY HIGH TEMPERATURE PROCESSES MAY CAUSE SEVERE RESPIRATORY TRACT IRRITATION AND SYSTEMIC ABSORPTION. THE SYMPTOMS, POSSIBLY DELAYED 20-30 MINUTES, MAY INCLUDE HEADACHE, DIZZINESS, VOMITING, TINNITUS, DIMNESS OF VISION, RAPID, IRREGULAR RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, RESPIRATORY FAILURE, AND DEATH ARE POSSIBLE. PATHOLOGIC FINDINGS AS DETAILED IN ACUTE SKIN EXPOSURE MAY BE FOUND.

CHRONIC EXPOSURE- CHRONIC INHALATION OF VAPORS MAY RESULT IN RESPIRATORY TRACT IRRITATION AND DISTURBANCES OF THE NERVOUS, GASTROINTESTINAL AND VASCULAR SYSTEMS. SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, FAINTING, FACIAL MUSCLE SPASMS, TREMORS, MENTAL DISTURBANCES, DIFFICULTY IN SWALLOWING, SALIVATION, NAUSEA, VOMITING, DIARRHEA, ANOREXIA, HYPERTENSION, SLIGHTLY ENLARGED HEART, AND SKIN RASH. LIVER AND KIDNEY DAMAGE ARE POSSIBLE AND, IF SEVERE, MAY RESULT IN DEATH.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

O-CRESOL:

CORROSIVE/SENSITIZER/NARCOTIC/TOXIC.

ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION WITH PRICKLING AND INTENSE BURNING FOLLOWED BY LOCAL ANESTHESIA. THE AFFECTED TISSUES MAY FIRST SHOW A WHITE DISCOLORATION WITH WRINKLING AND SOFTENING AND MAY SUBSEQUENTLY BECOME GANGRENOUS. SENSITIZATION DERMATITIS MAY OCCUR IN PERSONS

PREVIOUSLY EXPOSED. ABSORPTION THROUGH THE SKIN MAY OCCUR WITH SYSTEMIC TOXICITY AS DETAILED IN ACUTE INHALATION.

CHRONIC EXPOSURE- DEPENDING ON CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED CONTACT MAY RESULT IN LOCAL EFFECTS AS THOSE IN ACUTE EXPOSURE. RARELY, PROLONGED CONTACT MAY RESULT IN A PIGMENTARY DISORDER CALLED OCHRONOSIS, A DARKENING OF THE SKIN. REPEATED OR PROLONGED CONTACT MAY RESULT IN SENSITIZATION DERMATITIS. REPEATED SKIN ABSORPTION MAY RESULT IN SYSTEMIC TOXICITY AS DETAILED IN CHRONIC INHALATION. EVALUATED TO RTECS AS PRODUCING NEOPLASTIC TUMORS IN MICE.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

O-CRESOL:

CORROSIVE.

ACUTE EXPOSURE- CRESOL SOLUTIONS SPLASHED IN THE EYE MAY CAUSE PERMANENT CORNEAL OPACIFICATION AND VASCULARIZATION, HYPEREMIA, AND SWELLING OF THE CONJUNCTIVA. INJURY FROM CRESOLS DEPENDS ON THE CONCENTRATION AND THE DURATION OF CONTACT.

CHRONIC EXPOSURE- DEPENDING ON CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED CONTACT MAY RESULT IN EFFECTS AS THOSE IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

O-CRESOL:

CORROSIVE/NARCOTIC/TOXIC.

ACUTE EXPOSURE- MAY CAUSE SEVERE MUCOSAL IRRITATION WITH INTENSE BURNING IN THE MOUTH AND THROAT FOLLOWED BY MARKED ABDOMINAL PAIN AND DISTRESS, NAUSEA, VOMITING, AND DIARRHEA. IT IS READILY ABSORBED BY THE GASTROINTESTINAL TRACT TO CAUSE SYSTEMIC EFFECTS WHICH MAY BE DELAYED 20-30 MINUTES. THE SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, TINNITUS, DIMNESS OF VISION, IRREGULAR, RAPID RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. OTHER POSSIBLE EFFECTS INCLUDE PULMONARY EDEMA, PNEUMONIA, KIDNEY CONGESTION AND FAILURE, PANCREATITIS, AND DAMAGE TO THE LIVER AND SPLEEN. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, AND DEATH MAY OCCUR. PATHOLOGIC FINDINGS AS DETAILED IN ACUTE SKIN EXPOSURE MAY BE FOUND.

CHRONIC EXPOSURE- NO SPECIFIC DATA AVAILABLE. MAY CAUSE SYSTEMIC SYMPTOMS AS DETAILED IN CHRONIC INHALATION.

FIRST AID- IN THE ABSENCE OF CORROSIVE INJURY, REMOVE POISON BY IPECAC EMESIS. ACTIVATED CHARCOAL IS ALSO USEFUL. FOLLOW WITH 240 ML OF MILK. GASTRIC LAVAGE AND EMESIS ARE CONTRAINDICATED IN THE PRESENCE OF ESOPHAGEAL

INJURY (DREISBACH, HANDBOOK OF POISONING, 12TH EDITION). GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

O-CRESOL:

CHLOROSULFONIC ACID: MAY CAUSE AN INCREASE IN TEMPERATURE IF MIXED IN A CLOSED CONTAINER.

NITRIC ACID: MAY CAUSE AN INCREASE IN TEMPERATURE IF MIXED IN A CLOSED CONTAINER.

OLEUM: MAY CAUSE AN INCREASE IN TEMPERATURE IF MIXED IN A CLOSED CONTAINER.

OXIDIZERS (STRONG): VIGOROUS REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION. SEPARATE FROM OXIDIZING MATERIALS (NFPA, HAZARDOUS CHEMICALS DATA, 1991).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U052.

O-CRESOL - REGULATORY LEVEL: 200.0 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D023.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER USED TO KNOCK DOWN VAPORS MAY BECOME CORROSIVE OR TOXIC AND SHOULD BE CONTAINED PROPERLY FOR LATER DISPOSAL.

WATER SPILL:
USE ACTIVATED CARBON TO ABSORB SPILLED SUBSTANCE THAT IS DISSOLVED.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

TRAP SPILLED MATERIAL AT BOTTOM IN DEEP WATER POCKETS, EXCAVATED HOLDING AREAS OR WITHIN SAND BAG BARRIERS.

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINERS AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE

AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROCESS ENCLOSURE VENTILATION RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CRESOL (ALL ISOMERS):

23 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST AND MIST FILTER.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

57.5 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST AND MIST FILTER.

115 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
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.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

250 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A 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.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 10/02/84 REVISION DATE: 02/25/92

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P-CRESOL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS17610

CAS#: 106-44-5 FORMULA: C7H8O

P-CRESOL IS A COLORLESS SOLID WITH A TAR-LIKE ODOR. YOU CAN SMELL IT AT 0.2 PART PER MILLION.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 187 C (86 C). SLIGHT FIRE HAZARD. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE ALLERGIC REACTIONS AND BURNS OF THE NOSE, THROAT, MOUTH, STOMACH, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, HEADACHE, RINGING IN THE EARS, VISION DISTURBANCES, WEAK PULSE, NAUSEA, VOMITING, STOMACH PAIN, VOMITING, DIFFICULTY BREATHING, AND UNCONSCIOUSNESS. DEATH IS POSSIBLE BY SKIN CONTACT.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN, DROOLING, SKIN RASH, HIGH BLOOD PRESSURE, FAINTING, DIFFICULTY SWALLOWING, TWITCHING, MUSCLE CRAMPS, AND HEART, LIVER, AND KIDNEY EFFECTS MAY OCCUR. MAY CAUSE TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS17610
106-44-5
P-CRESOL

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OHS17610

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 106-44-5
RTECS NUMBER: G06475000

SUBSTANCE: P-CRESOL

TRADE NAMES/SYNONYMS:

4-METHYL-PHENOL; 4-CRESOL; P-CRESYLIC ACID; P-HYDROXYTOLUENE;
4-HYDROXYTOLUENE; P-KRESOL; P-METHYLHYDROXYBENZENE; P-METHYLPHENOL;
4-METHYLPHENOL; P-OXYTOLUENE; P-TOLUOL; P-TOLYL ALCOHOL; PARA-CRESOL;
PHENOL, 4-METHYL; U052; UN 2076; O-2042; C7H8O; OHS17610

CHEMICAL FAMILY:
HYDROXYL, AROMATIC

MOLECULAR FORMULA: C7-H8-O

MOLECULAR WEIGHT: 108.45

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=2 REACTIVITY=0 PERSISTENCE=2
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=2 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: P-CRESOL
CAS# 106-44-5

PERCENT: >99.0

OTHER CONTAMINANTS: META- AND ORTHO- ISOMERS

EXPOSURE LIMITS:

CRESOL (ALL ISOMERS):

5 PPM (22 MG/M3) OSHA TWA (SKIN)
5 PPM (22 MG/M3) ACGIH TWA (SKIN)
2.3 PPM (10 MG/M3) NIOSH RECOMMENDED TWA
5 PPM (22 MG/M3) DFG MAK TWA (SKIN);
10 PPM (44 MG/M3) DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; ACETONE; GAS CHROMATOGRAPHY WITH FLAME
IONIZATION DETECTION; (NIOSH VOL. III # 2001).

1000 POUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS CRYSTALS WITH A SWEET TARRY ODOR.

BOILING POINT: 395 F (202 C) MELTING POINT: 96 F (36 C)

SPECIFIC GRAVITY: 1.034 VAPOR PRESSURE: 0.1 @ 20 C

SOLUBILITY IN WATER: 1.8% ODOR THRESHOLD: 0.2 PPM VAPOR DENSITY: 3.72

SOLVENT SOLUBILITY: FIXED ALKALI HYDROXIDES, ORGANIC SOLVENTS, VEGETABLE OILS, ETHER, ALCOHOL, BENZENE, GLYCOL

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

DUST-AIR MIXTURES MAY IGNITE OR EXPLODE.

FLASH POINT: 187 F (86 C) (CC) LOWER EXPLOSIVE LIMIT: 1.1% @ 302 F

AUTOIGNITION TEMP.: 1038 F (559 C) FLAMMABILITY CLASS(OSHA): IIIA

FIREFIGHTING MEDIA:

DRY CHEMICAL, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

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 (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 55).

USE FLOODING AMOUNTS OF WATER AS A FOG; SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.245
EXCEPTIONS: 49 CFR 173.244

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
CRESOLS-UN 2076

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

P-CRESOL:

IRRITATION DATA: 517 MG/24 HOURS SKIN-RABBIT SEVERE; 103 MG EYE-RABBIT SEVERE.
TOXICITY DATA: 301 MG/KG SKIN-RABBIT LD50; 750 MG/KG SKIN-RAT LD50; 207 MG/KG
ORAL-RAT LD50; 344 MG/KG ORAL-MOUSE LD50; 620 MG/KG ORAL-RABBIT LDLO;
500 MG/KG SUBCUTANEOUS-RAT LDLO; 150 MG/KG SUBCUTANEOUS-MOUSE LD50;
200 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 300 MG/KG SUBCUTANEOUS-RABBIT LDLO;
80 MG/KG SUBCUTANEOUS-CAT LDLO; 180 MG/KG INTRAVENOUS-RABBIT LDLO; 25 MG/KG
INTRAPERITONEAL-MOUSE LD50; 1440 MG/KG UNREPORTED-RAT LD50; 160 MG/KG
UNREPORTED-MOUSE LD50; MUTAGENIC DATA (RTECS); TUMORIGENIC DATA
(RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.

ACUTE TOXICITY LEVEL: TOXIC BY DERMAL ABSORPTION AND INGESTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; SENSITIZER-DERMAL.

POISONING MAY AFFECT THE LIVER, KIDNEYS, AND THE RESPIRATORY AND
CARDIOVASCULAR SYSTEMS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

P-CRESOL:

CORROSIVE/NARCOTIC. 250 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- HUMANS EXPOSED EXPERIMENTALLY TO 6 MG/M3 OF THE ORTHO ISOMER REPORTED NASAL CONSTRICTION, THROAT IRRITATION, RESPIRATORY MUCOSA DRYNESS AND SENSATION OF AN UNSPECIFIED TASTE. HOWEVER, INHALATION IS NOT USUALLY AN ACUTE HAZARD DUE TO THE LOW VAPOR PRESSURE AND THE DISAGREEABLE ODOR WHICH IS DETECTABLE EVEN AT LOW CONCENTRATIONS. EXPOSURE TO AEROSOLS OR TO VAPORS PRODUCED BY HIGH TEMPERATURE PROCESSES MAY CAUSE SEVERE RESPIRATORY TRACT IRRITATION AND SYSTEMIC ABSORPTION. THE SYMPTOMS, POSSIBLY DELAYED 20-30 MINUTES, MAY INCLUDE HEADACHE, DIZZINESS, VOMITING, TINNITUS, DIMNESS OF VISION, RAPID, IRREGULAR RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, RESPIRATORY FAILURE, AND DEATH ARE POSSIBLE. PATHOLOGIC FINDINGS AS DETAILED IN ACUTE SKIN EXPOSURE MAY BE FOUND.

CHRONIC EXPOSURE- CHRONIC INHALATION OF VAPORS MAY RESULT IN RESPIRATORY TRACT IRRITATION AND DISTURBANCES OF THE NERVOUS, GASTROINTESTINAL AND VASCULAR SYSTEMS. SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, FAINTING, FACIAL MUSCLE SPASMS, TREMORS, MENTAL DISTURBANCES, DIFFICULTY IN SWALLOWING, SALIVATION, NAUSEA, VOMITING, DIARRHEA, ANOREXIA, HYPERTENSION, SLIGHTLY ENLARGED HEART, AND SKIN RASH. LIVER AND KIDNEY DAMAGE ARE POSSIBLE AND, IF SEVERE, MAY RESULT IN DEATH.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

P-CRESOL:

CORROSIVE/SENSITIZER/NARCOTIC/TOXIC.

ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION. PRICKLING AND INTENSE BURNING MAY OCCUR AFTER A FEW MINUTES FOLLOWED BY LOCAL ANESTHESIA. AFFECTED TISSUES MAY INITIALLY SHOW WHITE DISCOLORATION, WRINKLING, AND SOFTENING, WHICH SUBSEQUENTLY MAY BECOME GANGRENOUS. SENSITIZATION DERMATITIS MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS. IT IS READILY ABSORBED THROUGH THE SKIN TO CAUSE SYSTEMIC EFFECTS WHICH MAY BE DELAYED 20-30 MINUTES. THE SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, VOMITING, TINNITUS, DIMNESS OF VISION, IRREGULAR, RAPID RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, AND DEATH MAY OCCUR. PATHOLOGICAL FINDINGS HAVE INCLUDED PULMONARY HYPEREMIA, EMPHYSEMA, AND EDEMA; BRONCHOPNEUMONIA WITH PETECHIAL HEMORRHAGES IN THE PLEURA; AND NODULAR PNEUMONIA. KIDNEYS HAVE SHOWN PARENCHYMATOUS AND HEMORRHAGIC NEPHRITIS AND TUBULE DAMAGE. THE LIVER HAS SHOWN CONGESTION WITH PALLOR AND NECROSIS OF HEPATIC CELLS. DEGENERATED

MYOCARDIUM AND SMALL HEMORRHAGES IN THE EPICARDIUM AND ENDOCARDIUM HAVE BEEN SEEN. CONGESTION IN THE BRAIN AND DAMAGE TO THE PANCREAS AND SPLEEN HAVE ALSO BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO LOW CONCENTRATIONS MAY CAUSE DERMATITIS AND EVEN VERY DILUTE SOLUTIONS MAY CAUSE SENSITIZATION. RARELY, PROLONGED CONTACT MAY RESULT IN A PIGMENTORY DISORDER CALLED OCHRONOSIS, WHICH IS A DARKENING OF THE CONJUNCTIVA, SKIN AND CARTILAGE OF THE NOSE AND EARS. REPEATED ABSORPTION MAY RESULT IN DISTURBANCES OF THE NERVOUS, GASTROINTESTINAL AND VASCULAR SYSTEMS. SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, FAINTING, FACIAL MUSCLE SPASMS, TREMORS, MENTAL DISTURBANCES, DIFFICULTY IN SWALLOWING, SALIVATION, NAUSEA, VOMITING, DIARRHEA, ANOREXIA, HYPERTENSION, SLIGHTLY ENLARGED HEART, AND SKIN RASH. LIVER AND KIDNEY DAMAGE ARE POSSIBLE AND, IF SEVERE, MAY RESULT IN DEATH. AS EVALUATED BY RTECS, ADMINISTRATION TO MICE BY SKIN APPLICATION RESULTED IN NEOPLASTIC TUMORS ON SKIN OR APPENDAGES.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

P-CRESOL:

CORROSIVE.

ACUTE EXPOSURE- CRESOL SOLUTIONS SPLASHED IN THE EYE MAY CAUSE PERMANENT CORNEAL OPACIFICATION AND VASCULARIZATION, HYPEREMIA, AND SWELLING OF THE CONJUNCTIVA. INJURY FROM CRESOLS DEPENDS ON THE CONCENTRATION AND THE DURATION OF CONTACT.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

P-CRESOL:

CORROSIVE/NARCOTIC/TOXIC.

ACUTE EXPOSURE- MAY CAUSE SEVERE MUCOSAL IRRITATION WITH INTENSE BURNING IN THE MOUTH AND THROAT FOLLOWED BY MARKED ABDOMINAL PAIN AND DISTRESS, NAUSEA, VOMITING, AND DIARRHEA. IT IS READILY ABSORBED BY THE GASTROINTESTINAL TRACT TO CAUSE SYSTEMIC EFFECTS WHICH MAY BE DELAYED 20-30 MINUTES. THE SYMPTOMS MAY INCLUDE HEADACHE, DIZZINESS, TINNITUS, DIMNESS OF VISION, IRREGULAR, RAPID RESPIRATION, WEAK PULSE, DYSPNEA, PROFOUND MUSCULAR WEAKNESS, AND OCCASIONALLY, MENTAL CONFUSION. OTHER POSSIBLE EFFECTS INCLUDE PULMONARY EDEMA, PNEUMONIA, KIDNEY CONGESTION AND FAILURE, PANCREATITIS, AND DAMAGE TO THE LIVER AND SPLEEN. IF SUFFICIENT AMOUNTS ARE ABSORBED, VASCULAR COLLAPSE, SHOCK, HYPOTHERMIA, UNCONSCIOUSNESS, AND DEATH MAY OCCUR. PATHOLOGIC FINDINGS AS DETAILED IN ACUTE SKIN EXPOSURE MAY BE FOUND.

CHRONIC EXPOSURE- NO SPECIFIC DATA AVAILABLE. MAY CAUSE SYSTEMIC SYMPTOMS AS

DETAILED IN CHRONIC INHALATION.

FIRST AID- IF VICTIM IS CONSCIOUS, AND IF CORROSIVE INJURY IS ABSENT, REMOVE POISON BY GASTRIC LAVAGE OR EMESIS. ACTIVATED CHARCOAL IS USEFUL. FOLLOW WITH 240 ML OF MILK. GASTRIC LAVAGE AND EMESIS ARE NOT TO BE USED IN THE PRESENCE OF ESOPHAGEAL INJURY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

P-CRESOL:

ACIDS (STRONG): VIOLENT REACTION.

CHLOROSULFONIC ACID: INCREASE IN TEMPERATURE AND PRESSURE IN A CLOSED CONTAINER.

METALS (ACTIVE): VIOLENT REACTION.

NITRIC ACID: INCREASE IN TEMPERATURE AND PRESSURE IN A CLOSED CONTAINER.

OLEUM: INCREASE IN TEMPERATURE AND PRESSURE IN A CLOSED CONTAINER.

OXIDIZERS: VIGOROUS REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION. SEPARATE FROM OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1991).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U052.

P-CRESOL - REGULATORY LEVEL: 200.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D025.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

AIR SPILL:

KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER USED TO KNOCK DOWN VAPORS MAY BECOME CORROSIVE OR TOXIC AND SHOULD BE CONTAINED PROPERLY FOR LATER DISPOSAL.

WATER SPILL:

TRAP SPILLED MATERIAL AT BOTTOM IN DEEP WATER POCKETS, EXCAVATED HOLDING AREAS OR WITHIN SAND BAG BARRIERS.

USE ACTIVATED CARBON TO ABSORB SPILLED SUBSTANCE THAT IS DISSOLVED.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINERS AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE

CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

CRESOL (ALL ISOMERS):

23 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST AND MIST FILTER.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

57.5 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST AND MIST FILTER.

115 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
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.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

250 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A 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.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/21/84 REVISION DATE: 02/25/92

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EUROPIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS09670

CAS#: 7440-53-1 FORMULA: EU

EUROPIUM IS A SOFT STEEL-GRAY METALLIC SOLID.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. DUST-AIR MIXTURES MAY CATCH FIRE OR EXPLODE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

FOR SMALL FIRES: USE DRY CHEMICAL, SODA ASH, LIME OR SAND.

FOR LARGE FIRES: WITHDRAW FROM THE AREA AND LET FIRE BURN.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE SKIN AND EYES. ADDITIONAL EFFECTS MAY INCLUDE BLOOD EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, SENSITIVITY TO HEAT, ITCHING, AND INCREASED AWARENESS OF ODOR AND TASTE MAY OCCUR. MAY CAUSE TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT DANGEROUSLY ON EXPOSURE TO AIR AND WATER. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SPILL OR LEAK:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OHS09670

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-53-1

SUBSTANCE: EUROPIUM

TRADE NAMES/SYNONYMS:
EU; OHS09670

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: EU

MOLECULAR WEIGHT: 151.96

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=2 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=4 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: EUROPIUM
CAS# 7440-53-1

PERCENT: 100.0

OTHER CONTAMINANTS: NONE.

EXPOSURE LIMITS:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: SOFT, MALLEABLE STEEL-GRAY METALLIC SOLID OR CUBES.

BOILING POINT: 2781 F (1527 C) MELTING POINT: 1512-1519 F (822-826 C)

SPECIFIC GRAVITY: 5.244 SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN LIQUID AMMONIA.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

DUST-AIR MIXTURES MAY IGNITE OR EXPLODE.

FINELY DIVIDED MATERIAL MAY IGNITE ON EXPOSURE TO AIR.

FIREFIGHTING MEDIA:

DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

EUROPIUM:

CARCINOGEN STATUS: NONE.

ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.

TARGET EFFECTS: NO DATA AVAILABLE.

ADDITIONAL DATA: RARE EARTHS MAY AFFECT BLOOD CLOTTING.*

* BASED ON GENERAL INFORMATION ON RARE EARTHS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

EUROPIUM:

ACUTE EXPOSURE- NO SPECIFIC DATA AVAILABLE.

CHRONIC EXPOSURE- SOME RARE EARTHS MAY CAUSE LUNG GRANULOMAS. INHALATION OF RARE EARTHS IN HUMANS HAS CAUSED SENSITIVITY TO HEAT, ITCHING, AND AN INCREASED AWARENESS OF ODOR AND TASTE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

EUROPIUM:

ACUTE EXPOSURE- NO SPECIFIC DATA AVAILABLE. APPLICATION OF RARE EARTHS TO ABRADED SKIN MAY CAUSE EXTENSIVE INJURY RESULTING IN EPILATION AND SCAR FORMATION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

EUROPIUM:

ACUTE EXPOSURE- NO SPECIFIC DATA AVAILABLE. RARE EARTHS MAY IRRITATE THE CONJUNCTIVA. WHEN APPLIED TO DENUDED ANIMAL CORNEAS, OPACIFICATION HAS OCCURRED AFTER A LATENT PERIOD OF SEVERAL HOURS OR DAYS.

FIRST AID- WASH 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.

INGESTION:

EUROPIUM:

ACUTE EXPOSURE- NO SPECIFIC DATA AVAILABLE. THE ORAL TOXICITY OF THE RARE EARTHS IS LOW OWING TO POOR GASTROINTESTINAL ABSORPTION.

CHRONIC EXPOSURE- ANIMALS FED RARE EARTHS FOR SEVERAL MONTHS AT LEVELS UP TO 1% IN THE DIET, SHOWED NO HISTOLOGICAL OR GROWTH CHANGES AT THE LOWER LEVELS. HOWEVER, NONSPECIFIC LIVER DAMAGE WAS SEEN WITH SOME OF THE RARE EARTH COMPOUNDS TESTED AT 1%.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

EUROPIUM:

MAY IGNITE ON EXPOSURE TO AIR IF FINELY DIVIDED. MAY REACT WITH WATER.

INCOMPATIBILITIES:

EUROPIUM:

HALOGENS: BURNS VIGOROUSLY ABOVE 392 F.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE UNDER INERT ATMOSPHERE.

PROTECT FROM MOISTURE.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBERS, D001 AND D003. 100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 08/29/91 REVISION DATE: 08/30/91

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HYDROCHLORIC ACID, CONCENTRATED (36-37%) MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS11155

CAS#: 7647-01-0 FORMULA: CLH

HYDROCHLORIC ACID, CONCENTRATED (36-37%) IS A COLORLESS OR SLIGHTLY YELLOW LIQUID WITH A STRONG ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, SKIN, MOUTH, STOMACH, AND EYES WITH POSSIBLE BLINDNESS. COMPRESSED GAS MAY CAUSE FROSTBITE. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, CHILLS, FEVER, THIRST, DROOLING, NAUSEA, VOMITING, DIARRHEA, COUGHING, CHOKING, IRREGULAR HEARTBEAT, AND LUNG DAMAGE. MAY CAUSE REPRODUCTIVE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, AND DISCOLORATION AND DAMAGE OF THE TEETH MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT WITH WATER GENERATING MUCH HEAT AND DANGEROUS SUBSTANCES. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS11155

7647-01-0

HYDROCHLORIC ACID, CONCENTRATED (36-37%)

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OHS11155

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7647-01-0
RTECS NUMBER: MW4025000

SUBSTANCE: HYDROCHLORIC ACID, CONCENTRATED (36-37%)

TRADE NAMES/SYNONYMS:

CHLOROHYDRIC ACID; HYDROCHLORIDE; MURIATIC ACID; SPIRITS OF SALT;
HYDROCHLORIC ACID, CONCENTRATED; HYDROGEN CHLORIDE, 23 EB; UN 1789; OHS11155

CHEMICAL FAMILY:
INORGANIC ACID

MOLECULAR FORMULA: H-CL

MOLECULAR WEIGHT: 36.46

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: HYDROGEN CHLORIDE PERCENT: 37.0
CAS# 7647-01-0

COMPONENT: WATER PERCENT: 63.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):

5 PPM (7.6 MG/M3) OSHA CEILING
5 PPM (7.6 MG/M3) ACGIH CEILING
5 PPM (7.6 MG/M3) NIOSH RECOMMENDED CEILING
5 PPM (7.6 MG/M3) DFG MAK TWA;
10 PPM (15.2 MG/M3) DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; SODIUM BICARBONATE/SODIUM CARBONATE;
ION CHROMATOGRAPHY; (NIOSH VOL. III # 7903, INORGANIC ACIDS).

500 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY (GAS)
5000 POUND SARA SECTION 304 REPORTABLE QUANTITY (GAS)
5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY (LIQUID)

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS OR SLIGHTLY YELLOW FUMING LIQUID WITH A PUNGENT
ODOR. BOILING POINT: 384 F (196 C) SPECIFIC GRAVITY: 1.2
VAPOR PRESSURE: NOT AVAILABLE PH: 1.1 (0.1 N)
SOLUBILITY IN WATER: SOLUBLE VAPOR DENSITY: 1.3

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS (1990 EMERGENCY RESPONSE GUIDEBOOK,
DOT P 5800.5, GUIDE PAGE 60).

EXTINGUISH USING AGENTS SUITABLE FOR TYPE OF FIRE. USE FLOODING AMOUNTS OF
WATER AS FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS
FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.263
EXCEPTIONS: 49 CFR 173.244

TOXICITY

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):

IRRITATION DATA:

ANHYDROUS: 100 MG RINSED EYE-RABBIT MILD.

HYDROCHLORIC ACID: 5 MG/30 SECONDS RINSED EYE-RABBIT MILD.

TOXICITY DATA:

HYDROGEN CHLORIDE (ANHYDROUS GAS): 4701 PPM/30 MINUTES INHALATION-RAT LC50;

2644 PPM/30 MINUTES INHALATION-MOUSE LC50.

MONOHYDRATE: NO DATA AVAILABLE.

DIHYDRATE: NO DATA AVAILABLE.

TRIHYDRATE: NO DATA AVAILABLE.

HEXAHYDRATE: NO DATA AVAILABLE.

HYDROGEN CHLORIDE (AEROSOL): 5666 PPM/30 MINUTES INHALATION-RAT LC50; 2142 PPM/30 MINUTES INHALATION-MOUSE LC50.

HYDROCHLORIC ACID: 1300 PPM/30 MINUTES INHALATION-HUMAN LCLO; 3000 PPM/5

MINUTES INHALATION-HUMAN LCLO; 81 MG/KG UNREPORTED MAN LDLO;

3124 PPM/1 HOUR INHALATION-RAT LC50; 1108 PPM/1 HOUR INHALATION-MOUSE

LC50; 1449 MG/KG INTRAPERITONEAL-MOUSE LD50; 900 MG/KG ORAL-RABBIT

LD50; 4413 PPM/30 MINUTES INHALATION-RABBIT LCLO; 4413 PPM/30

MINUTES INHALATION-GUINEA PIG LCLO; MUTAGENIC DATA (RTECS);

REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE AND INGESTION.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION, INGESTION.

TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):

CORROSIVE. 100 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF GAS OR FUMES AT LEVELS OF 5-35 PPM MAY

CAUSE IRRITATION AND BURNING OF THE THROAT, COUGHING AND CHOKING;

50-100 PPM MAY BE BARELY TOLERABLE FOR 1 HOUR. HIGH LEVELS MAY CAUSE

INFLAMMATION AND OCCASIONALLY ULCERATION OF THE NOSE, THROAT OR LARYNX,

BRONCHITIS, PNEUMONIA, PALPITATIONS AND HEADACHE. HIGHER CONCENTRATIONS

MAY CAUSE NECROSIS OF THE TRACHEAL AND BRONCHIAL EPITHELIUM, NASOSEPTAL

PERFORATION, ATELECTASIS, EMPHYSEMA, DAMAGE TO PULMONARY BLOOD VESSELS

AND LESIONS OF THE LIVER AND OTHER ORGANS. DEATH MAY BE DUE TO LARYNGEAL

SPASM, BRONCHOPNEUMONIA OR PULMONARY EDEMA. 1300-2000 PPM MAY BE

DANGEROUS, EVEN ON BRIEF EXPOSURES. REPRODUCTIVE EFFECTS HAVE BEEN

REPORTED IN ANIMALS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE EROSION AND

DISCOLORATION OF EXPOSED TEETH, CHRONIC BRONCHITIS AND GASTRITIS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):
CORROSIVE.

ACUTE EXPOSURE- CONTACT MAY CAUSE SEVERE IRRITATION, INFLAMMATION, ULCERATION, NECROSIS AND CHEMICAL BURNS. SHOCK SYMPTOMS MAY DEVELOP INCLUDING RAPID PULSE, SWEATING AND COLLAPSE. PHOTSENSITIZATION REACTIONS MAY OCCUR IN PERSONS PREVIOUSLY EXPOSED. CONTACT WITH A COMPRESSED GAS MAY CAUSE FROSTBITE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH VAPORS OR DILUTE SOLUTIONS MAY CAUSE DERMATITIS. PHOTSENSITIZATION MAY OCCUR.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):
CORROSIVE.

ACUTE EXPOSURE- CONTACT MAY CAUSE SEVERE IRRITATION, CONJUNCTIVITIS, CORNEAL NECROSIS AND BURNS WITH IMPAIRMENT OR PERMANENT LOSS OF VISION. A DROP OF HYDROCHLORIC ACID SPLASHED IN THE EYE AND IMMEDIATELY WASHED OUT HAS PRODUCED A WHITE COAGULATION OF THE CORNEAL AND CONJUNCTIVAL EPITHELIUM. ANIMALS EXPOSED TO VAPOR CONCENTRATIONS OF 1350 PPM FOR ONE AND A HALF HOURS SHOWED CLOUDING OF THE CORNEA AND 300 PPM FOR 6 HOURS SHOWED SLIGHT EROSION OF THE CORNEAL EPITHELIUM. CONTACT WITH A COMPRESSED GAS MAY CAUSE FROSTBITE.

CHRONIC EXPOSURE- ANIMALS EXPOSED TO VAPOR AT 100 PPM FOR 6 HOURS DAILY FOR 50 DAYS SHOWED ONLY SLIGHT UNREST AND IRRITATION OF THE EYES, BUT NO OCULAR INJURY. EFFECTS ARE DEPENDENT UPON CONCENTRATION AND DURATION OF EXPOSURE. CONJUNCTIVITIS OR EFFECTS SIMILAR TO THOSE FOR ACUTE EXPOSURE MAY OCCUR.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):
CORROSIVE.

ACUTE EXPOSURE- INGESTION OF THE ACID MAY CAUSE BURNS OF THE MOUTH, THROAT, ESOPHAGUS AND STOMACH WITH CONSEQUENT PAIN, UNEASINESS, NAUSEA, SALIVATION, VOMITING, DIARRHEA, CHILLS, SHOCK AND INTENSE THIRST. NEPHRITIS, FEVER AND PERFORATION OF THE INTESTINAL TRACT, AND CIRCULATORY COLLAPSE MAY OCCUR. DEATH MAY BE DUE TO ESOPHAGEAL OR GASTRIC NECROSIS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS, ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION

IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

REACTS EXOTHERMICALLY WITH WATER OR STEAM TO PRODUCE TOXIC AND CORROSIVE FUMES.

INCOMPATIBILITIES:

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):

ACETIC ANHYDRIDE: VIOLENT REACTION.

ALCOHOLIC HYDROGEN CYANIDE: EXPLOSIVE REACTION.

ALUMINUM: EXPLOSION.

ALUMINUM-TITANIUM ALLOYS: IGNITES OR INCANDESCES WHEN HEATED.

2-AMINOETHANOL: VIOLENT REACTION.

AMMONIUM HYDROXIDE: VIOLENT REACTION.

BASES: VIOLENT REACTION.

BRASS: CORRODES.

BRONZE: CORRODES.

CALCIUM CARBIDE: REACTS WITH INCANDESCENCE.

CALCIUM HYPOCHLORITE: IGNITION.

CESIUM ACETYLIDE: IGNITES ON CONTACT.

CHLORINE + DINITROANILINES: VIGOROUS REACTION WITH RELEASE OF FLAMMABLE HYDROGEN GAS FUMES.

CHLOROSULFONIC ACID: VIOLENT REACTION.

1,1-DIFLUOROETHYLENE: EXTREMELY EXOTHERMIC DECOMPOSITION REACTION.

DOWICIL 100: DECOMPOSES.

ETHYLENE DIAMINE: VIOLENT REACTION.

ETHYLENE IMINE: VIOLENT REACTION.

FLUORINE: IGNITES ON CONTACT.

HEXALITHIUM DISILICIDE: INCANDESCES.

IRON: CORRODES WITH EVOLUTION OF FLAMMABLE HYDROGEN GAS.

MAGNESIUM BORIDE: PRODUCES A SPONTANEOUSLY FLAMMABLE GAS.

MERCURIC SULFATE: VIOLENT REACTION AT 125 C.

METAL ACETYLIDES: VIOLENT REACTION.

METALS: SEVERE CORROSION WITH EVOLUTION OF FLAMMABLE HYDROGEN GAS.

OLEUM: VIOLENT REACTION.

OXIDIZERS (STRONG): VIOLENT REACTION.

OXYGEN + PLATINUM: IGNITES ON CONTACT.

PERCHLORIC ACID: VIOLENT REACTION.

PLASTICS, RUBBER, COATINGS: ATTACKS.

POTASSIUM PERMANGANATE: EXPLOSION HAZARD.

BETA-PROPIOLACTONE: VIOLENT REACTION.

PROPYLENE OXIDE: VIOLENT REACTION.

RUBIDIUM ACETYLIDE: IGNITES ON CONTACT.

SILICA (GEL): INCOMPATIBLE.

SODIUM: VIGOROUS OR EXPLOSIVE REACTION.

SULFURIC ACID: EXPLOSIVE REACTION WITH RELEASE OF TOXIC HYDROGEN CHLORIDE GAS.

TETRASELENIUM TETRANITRIDE: EXPLODES ON CONTACT.
VINYL ACETATE: VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE CORROSIVE HYDROGEN CHLORIDE.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

PROTECT AGAINST PHYSICAL DAMAGE. STORE IN COOL, WELL-VENTILATED PLACE, SEPARATED FROM ALL OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. MAY IGNITE COMBUSTIBLES (WOOD, PAPER, OIL, ETC.).

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

AIR SPILL:

KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER USED TO KNOCK DOWN VAPORS MAY BECOME CORROSIVE OR TOXIC AND SHOULD BE CONTAINED PROPERLY FOR LATER DISPOSAL.

WATER SPILL:

NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM BICARBONATE.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

HYDROGEN CHLORIDE (HYDROCHLORIC ACID):

50 PPM- ANY SUPPLIED-AIR RESPIRATOR.

ANY SELF-CONTAINED BREATHING APPARATUS.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH CARTRIDGE(S) PROVIDING PROTECTION AGAINST HYDROCHLORIC ACID.

100 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT-, OR BACK- MOUNTED CANISTER PROVIDING PROTECTION AGAINST HYDROCHLORIC ACID.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND

CARTRIDGE(S) PROVIDING PROTECTION AGAINST HYDROCHLORIC ACID.
ANY POWERED, AIR-PURIFYING RESPIRATOR WITH CARTRIDGE(S) PROVIDING
PROTECTION AGAINST HYDROCHLORIC ACID.
ESCAPE- ANY AIR-PURIFYING, FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A
CHIN-STYLE, FRONT- OR BACK-MOUNTED ACID GAS CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A
FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE
EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN
AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 04/30/85 REVISION DATE: 04/10/92

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HYDROGEN FLUORIDE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS11170

CA# #: 7664-39-3 FORMULA: HF

HYDROGEN FLUORIDE IS A COLORLESS GAS OR LIQUID WITH A STRONG, IRRITATING ODOR. YOU CAN SMELL IT AT .04-1.34 PARTS PER MILLION.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, SKIN, EYES, AND STOMACH. ADDITIONAL EFFECTS MAY INCLUDE CHOKING, COUGHING, LUNG CONGESTION, COLDNESS, FAINTING, BLUISH SKIN AND FINGERTIPS, IRREGULAR HEARTBEAT, BLINDNESS, KIDNEY DAMAGE WITH BLOOD IN THE URINE, HEART ATTACK, AND POSSIBLE DEATH BY INHALATION.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, TEARING AND BONE, LUNG, AND LIVER DAMAGE MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT WITH WATER GENERATING MUCH HEAT AND DANGEROUS SUBSTANCES. MAY REACT DANGEROUSLY WITH BASES AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS11170

7664-39-3

HYDROGEN FLUORIDE

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OHS11170

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7664-39-3
RTECS NUMBER: MW7875000

SUBSTANCE: HYDROGEN FLUORIDE

TRADE NAMES/SYNONYMS:

HYDROFLUORIC ACID; FLUORHYDRIC ACID; ANHYDROUS HYDROFLUORIC ACID;
HYDROFLUORIC ACID GAS; ANTISAL 2B; HYDROGEN FLUORIDE, ANHYDROUS;
STCC 4930024; UN 1052; A-146; A-147; FH; OHS11170

CHEMICAL FAMILY:
INORGANIC ACID

MOLECULAR FORMULA: H-F

MOLECULAR WEIGHT: 20.01

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=4 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: HYDROGEN FLUORIDE
CAS# 7664-39-3

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

HYDROGEN FLUORIDE, AS F:

3 PPM OSHA TWA; 6 PPM OSHA STEL
3 PPM (2.5 MG/M3) ACGIH CEILING
3 PPM (2.5 MG/M3) NIOSH RECOMMENDED 10 HOUR TWA;
6 PPM (5 MG/M3) NIOSH RECOMMENDED 15 MINUTE CEILING
3 PPM (2.5 MG/M3) DFG MAK TWA;
6 PPM (5 MG/M3) DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; SODIUM BICARBONATE/SODIUM CARBONATE;
ION CHROMATOGRAPHY; (NIOSH VOL. III # 7903, INORGANIC ACIDS).

100 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
100 POUNDS SARA SECTION 304 REPORTABLE QUANTITY
100 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS, FUMING LIQUID OR GAS WITH A STRONG, IRRITATING,
PUNGENT ODOR BOILING POINT: 67 F (20 C) MELTING POINT: -118 F (-83 C)
SPECIFIC GRAVITY: 0.987-0.991 VAPOR PRESSURE: 760 MMHG @ 20 C
PH: ACIDIC IN SOLUTION SOLUBILITY IN WATER: VERY SOLUBLE
ODOR THRESHOLD: 0.03 TO 0.11 MG/M3 VAPOR DENSITY: 0.7
SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, MANY ORGANIC SOLVENTS; SLIGHTLY
SOLUBLE IN ETHER, BENZENE, TOLUENE, M-XYLENE, TETRALIN
VISCOSITY: 0.256 CP @ 0 C (LIQUID)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL OR CARBON DIOXIDE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
DO NOT GET WATER INSIDE CONTAINER. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO
IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED
TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. ISOLATE
AREA UNTIL GAS HAS DISPERSED (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5,
GUIDE PAGE 15).

USE AGENT SUITABLE FOR TYPE OF FIRE; USE WATER IN FLOODING QUANTITIES AS A FOG
COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE
AS POSSIBLE. IN CASE OF LEAK EVACUATE FOR RADIUS OF 2500 FT. AVOID BREATHING
CORROSIVE VAPORS.

FIRE FIGHTING PHASES: USE WATER ON FIRE IN WHICH HYDROFLUORIC ACID IS INVOLVED
(NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.264
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
HYDROGEN FLUORIDE, ANHYDROUS-UN 1052

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
8 - CORROSIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG I

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
CORROSIVE, POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.163
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: FORBIDDEN

TOXICITY

HYDROGEN FLUORIDE:
IRRITATION DATA: 50 MG EYE-HUMAN SEVERE.
TOXICITY DATA: 100 MG/M3/1 MINUTE INHALATION-MAN TCLO; 50 PPM/30 MINUTES
INHALATION-HUMAN LCLO; 1276 PPM/1 HOUR INHALATION-RAT LC50; 342 PPM/1 HOUR
INHALATION-MOUSE LC50; 1774 PPM/1 HOUR INHALATION-MONKEY LC50;
260 MG/M3/7 HOURS INHALATION-RABBIT LCLO; 4327 PPM/15 MINUTES
INHALATION-GUINEA PIG LC50; 500 MG/KG SKIN-MOUSE LDLO; 25 MG/KG
INTRAPERITONEAL-RAT LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA
(RTECS).
CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
ACUTE TOXICITY LEVEL: TOXIC BY INHALATION.
TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

HYDROGEN FLUORIDE:

CORROSIVE/TOXIC. 30 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- TWO HUMAN SUBJECTS EXPOSED TO 120 PPM EXPERIENCED MARKED RESPIRATORY IRRITATION. THIS WAS THE HIGHEST CONCENTRATION THAT COULD BE TOLERATED FOR MORE THAN ONE MINUTE. 30 PPM CAUSED MILD NASAL IRRITATION AND COULD BE TOLERATED FOR SEVERAL MINUTES. HIGHER CONCENTRATIONS MAY CAUSE TRANSIENT CHOKING, COUGHING, CHILLS, CHEST PAIN AND CONSTRICTION, AND DYSPNEA. AN ASYMPTOMATIC PERIOD OF 12-48 HOURS MAY BE FOLLOWED BY FEVER, COUGH, DYSPNEA, CYANOSIS, RALES, AND PULMONARY EDEMA OR BRONCHIAL PNEUMONIA. IN HUMANS, KIDNEY DAMAGE HAS ONLY BEEN REPORTED IN SEVERE, ACUTE OVEREXPOSURES. IN FOUR SEPARATE EVENTS, 9 WORKERS WERE SPLASHED WITH HYDROFLUORIC ACID; 6 DIED. DEATH OCCURRED 2-10 HOURS AFTER EXPOSURE AND WAS CAUSED BY PULMONARY EDEMA, HEMORRHAGIC PULMONARY EDEMA AND ULCERATIVE TRACHEOBRONCHITIS, OR CARDIAC ARREST. IN ONE INSTANCE, THE BREATHING ZONE CONCENTRATION WAS ESTIMATED TO BE ABOVE 10,000 PPM.

CHRONIC EXPOSURE- 5 HUMAN SUBJECTS EXPOSED 6 HOURS/DAY, 5 DAYS/WEEK, FOR 10-50 DAYS AT AVERAGE CONCENTRATIONS OF UP TO 4.7 PPM EXPERIENCED SLIGHT NASAL IRRITATION. REPEATED EXPOSURE TO LOW CONCENTRATIONS MAY CAUSE NASAL CONGESTION, NOSEBLEEDS, SINUS PROBLEMS, AND BRONCHITIS. ABSORPTION OF EXCESSIVE AMOUNTS OF FLUORINE MAY RESULT IN FLUOROSIS, A SYNDROME CHARACTERIZED BY OSTEOSCLEROTIC BONE CHANGES. CASES OF VARYING DEGREES OF OSTEOSCLEROSIS HAVE BEEN REPORTED IN WORKERS EXPOSED TO HYDROGEN FLUORIDE FOR A NUMBER OF YEARS, USUALLY 3 OR MORE. THE FIRST EVIDENCE OF CHANGE IS MOST APPARENT IN THE PELVIS AND LUMBAR SPINE AND MAY BE ACCOMPANIED BY MILD TO MODERATE BACK PAIN AND STIFFNESS. PRESUMABLY, OTHER SYMPTOMS OF FLUOROSIS, WEIGHT LOSS, GENERAL ILL HEALTH, ANEMIA, BRITTLINESS OF THE BONES, AND DISCOLORATION OF DEVELOPING TEETH, ARE ALSO POSSIBLE. ANIMAL STUDIES INDICATE THAT REPEATED EXPOSURE MAY CAUSE PULMONARY, HEPATIC AND RENAL TISSUE DAMAGE. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

HYDROGEN FLUORIDE:

CORROSIVE.

ACUTE EXPOSURE- HYDROGEN FLUORIDE BURNS ARE CHARACTERIZED BY A BLANCHED APPEARANCE OF THE SKIN WITH PERSISTENT EXCRUCIATING PAIN, EDEMA AND NECROSIS. WITH CONCENTRATIONS LESS THAN 20%, PAIN AND ERYTHEMA MAY OCCUR AFTER A LATENT PERIOD OF 24 HOURS. WITH 20-50% SOLUTIONS,

BURNS MAY BE APPARENT WITHIN 1-8 HOURS. WITH CONCENTRATIONS GREATER THAN 50%, IMMEDIATE PAIN AND RAPIDLY APPARENT TISSUE DAMAGE OCCUR ON CONTACT. SMALL AMOUNTS OF HYDROGEN FLUORIDE WHICH ARE NOT WASHED OFF MAY CAUSE DELAYED DEVELOPMENT OF NON-HEALING ULCERS. FINGERNAILS AND NAIL BEDS MAY BE COMPLETELY DESTROYED. PENETRATION OF THE FLUORIDE ION TO DEEP TISSUES MAY RESULT IN SLOW HEALING NECROSIS OF SOFT TISSUES AND DECALCIFICATION OF BONE. VAPORS AT A CONCENTRATION OF 120 PPM CAUSED SMARTING OF EXPOSED SKIN IN PEOPLE IN ONE MINUTE. SYSTEMIC FLUORIDE POISONING THROUGH SKIN ABSORPTION MAY OCCUR. STUPOR, UNRESPONSIVENESS TO STIMULI OTHER THAN PAIN, SEVERE NAUSEA, VOMITING, AND REDUCED PULSE RATE WERE REPORTED IN ONE CASE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRRITATION OR BURNS. SLIGHT IRRITATION OCCURRED IN PEOPLE EXPOSED TO VAPOR CONCENTRATIONS AVERAGING 2.6 AND 4.7 PPM FOR PERIODS OF UP TO 50 DAYS. SLIGHT DESQUAMATION OF THE SUPERFICIAL EPITHELIUM OF THE FACE WAS OBSERVED IN ONE SUBJECT AFTER TEN DAYS OF EXPOSURE TO HYDROGEN FLUORIDE AT 3.4 PPM.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA IMMEDIATELY WITH LARGE AMOUNTS OF WATER FOR 30 MINUTES OR LONGER. APPLY 2.5% CALCIUM GLUCONATE GEL OR A PASTE MADE FROM EQUAL PARTS OF MAGNESIUM OXIDE AND MAGNESIUM SULFATE (EPSOM SALTS). (CAIN, EMERGENCY TREATMENT AND MANAGEMENT, 7TH ED.) IF FURTHER TREATMENT IS TO BE DELAYED, SOAK AREAS IN ICED MAGNESIUM SULFATE SOLUTION (25%). (GOSSELIN, CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 5TH ED.)

EYE CONTACT:

HYDROGEN FLUORIDE:

CORROSIVE.

ACUTE EXPOSURE- EXPOSURE TO HYDROGEN FLUORIDE AVERAGING 4.7 PPM FOR 6 HOURS, OR 30 PPM FOR SEVERAL MINUTES CAUSED MILD IRRITATION, WHILE 120 PPM RESULTED IN MARKED CONJUNCTIVAL IRRITATION WITHIN 1 MINUTE IN HUMANS. DIRECT CONTACT WITH THE LIQUID OR SOLUTIONS MAY CAUSE CORNEAL BURNS. IF NOT PROMPTLY REMOVED, PERMANENT VISUAL DEFECTS OR BLINDNESS MAY RESULT. ONE WORKER EXPOSED TO A FINE SPRAY OF CONCENTRATED HYDROGEN FLUORIDE, HAD LOSS OF EPITHELIUM FROM THE CORNEA AND CONJUNCTIVA, AND MARKED EDEMA OF THE EYELIDS, CONJUNCTIVA, AND CORNEAS; PROMPT TREATMENT WAS ADMINISTERED. NORMAL VISION WAS REGAINED WITHIN 19 DAYS.

CHRONIC EXPOSURE- HUMANS EXPERIMENTALLY EXPOSED TO CONCENTRATIONS WHICH AVERAGED 2.6-4.7 PPM FOR UP TO 50 DAYS DEVELOPED MILD EYE IRRITATION. IN ANIMALS, REPEATED OR PROLONGED EXPOSURE TO LOW VAPOR CONCENTRATIONS CAUSED SLIGHT LACRIMATION.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

HYDROGEN FLUORIDE:

CORROSIVE.

ACUTE EXPOSURE- INGESTION MAY CAUSE BURNS OF THE MOUTH, ESOPHAGUS, STOMACH

AND SMALL INTESTINE WITH GASTRITIS, GASTRIC HEMORRHAGES, VOMITING, NAUSEA, ABDOMINAL PAIN, AND DIARRHEA. LARGE DOSES MAY CAUSE EXTENSIVE NECROSIS WITH PERFORATION OF THE STOMACH, SHOCK AND DEATH. SYSTEMIC POISONING MAY CAUSE HYPOGLYCEMIA, HYPERKALEMIA, HYPOMAGNESEMIA, AND SEVERE HYPOCALCEMIA RESULTING IN TETANY, ESPECIALLY OF THE EXTREMITIES, AND PARESTHESIAS. HYPOTENSION, CIRCULATORY SHOCK AND CARDIAC ARRHYTHMIAS INCLUDING SINUS TACHYCARDIA OR VENTRICULAR FIBRILLATION, SOMETIMES PRECEDED BY TACHYCARDIA, MAY OCCUR. CENTRAL NERVOUS SYSTEM SYMPTOMS MAY INCLUDE HEADACHE, EXCESSIVE SALIVATION, NYSTAGMUS AND DILATED PUPILS, LETHARGY, STUPOR, COMA, AND RARELY, TRANSIENT CONVULSIONS. DEATH IS USUALLY DUE TO RESPIRATORY PARALYSIS OR CARDIAC FAILURE. IN NON-FATAL CASES, JAUNDICE AND KIDNEY DAMAGE WITH ALBUMINURIA, HEMATURIA, OLIGURIA OR ANURIA MAY OCCUR, BUT ARE GENERALLY REVERSIBLE. ASPIRATION MAY LEAD TO CHEMICAL PNEUMONITIS. CHRONIC EXPOSURE- CHRONIC INGESTION OF SMALL AMOUNTS MAY CAUSE FLUOROSIS WITH OSTEOSCLEROTIC THICKENING WITH CALCIFICATION IN LIGAMENTOUS ATTACHMENTS OF SKELETON, WEIGHT LOSS, BRITTLINESS OF BONES, REDUCED BONE MARROW SPACE WITH ANEMIA, WEAKNESS, GENERAL ILL HEALTH, STIFFNESS OF JOINTS, AND DISCOLORATION OF DEVELOPING TEETH. RARELY, CENTRAL NERVOUS SYSTEM INVOLVEMENT OCCURS.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS, ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

REACTS EXOTHERMICALLY WITH WATER OR STEAM WITH THE RELEASE OF TOXIC AND CORROSIVE FUMES.

INCOMPATIBILITIES:

HYDROGEN FLUORIDE:

ACETIC ANHYDRIDE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.

2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.

AMMONIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.

ARSENIC TRIOXIDE: INCANDESCENT REACTION.

BISMUTHIC ACID: VIOLENT REACTION EVOLVING OZONISED OXYGEN.

CALCIUM OXIDE: VERY VIOLENT REACTION WITH INCANDESCENCE.

CHLOROSULFURIC ACID: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.

COATINGS: ATTACKED.

CONCRETE: ATTACKED.

CYANOGEN FLUORIDE: EXPLOSIVE POLYMERIZATION REACTION.

DIPHOSPHOROUS PENTOXIDE: VIOLENT REACTION.

ETHYLENEDIAMINE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.

ETHYLENEIMINE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.

FLUORINE: ENERGETIC REACTION WITH IGNITION.
 GLASS: ATTACKED.
 LEATHER: ATTACKED.
 METALS: MAY GENERATE FLAMMABLE HYDROGEN GAS UPON CONTACT.
 MERCURY OXIDE: EXOTHERMIC REACTION UNLESS ADEQUATE COOLING KEEPS REACTION TEMPERATURE BELOW 0 C.
 METHANESULFONIC ACID: ELECTROLYSIS OF A MIXTURE PRODUCED OXYGEN DIFLUORIDE WHICH EXPLODED.
 NITRIC ACID: IGNITION.
 NITRIC ACID + GLYCEROL: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
 NITRIC ACID + LACTIC ACID: UNSTABLE MIXTURE.
 NITRIC ACID, PROPYLENE GLYCOL, AND SILVER NITRATE: UNSTABLE MIXTURE.
 OLEUM: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
 ORGANIC MATERIALS: ATTACKED.
 N-PHENYLAZOPIPERIDINE: VIOLENT REACTION.
 PHOSPHORUS(V) OXIDE: VIGOROUS REACTION BELOW 20 C.
 PLASTICS: ATTACKED.
 POTASSIUM PERMANGANATE: VIOLENT. EXOTHERMIC REACTION WITH CONCENTRATED ACID.
 POTASSIUM TETRAFLUOROSILICATE: VIOLENT EVOLUTION OF SILICON TETRAFLUORIDE.
 PROPIOLACTONE (BETA): TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
 PROPYLENE OXIDE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
 RUBBER (NATURAL): ATTACKED.
 SILICA CONTAINING MATERIALS: CORROSIVE.
 SODIUM: REACTS WITH EXPLOSIVE VIOLENCE WITH AQUEOUS ACID.
 SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
 SULFURIC ACID: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
 TETRAFLUOROSILICIC ACID: VIOLENT REACTION.
 VINYL ACETATE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY YIELD TOXIC AND CORROCIIVE FUMES OF FLUORIDES.

POLYMERIZATION:

AT LOW TEMPERATURES POLYMERS, ESPECIALLY (HF)₂ AND (HF)₆ ARE FORMED. THE DEGREE OF POLYMERIZATION VARIES DEPENDING ON THE PARTIAL PRESSURE OF THE HYDROGEN FLUORIDE AND THE TEMPERATURE.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

PROTECT AGAINST PHYSICAL DAMAGE. STORE IN WELL-VENTILATED AREA, SEPARATED FROM OTHER STORAGE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MATERIAL IS EXTREMELY POISONOUS; AVOID INHALATION OF VAPORS OR CONTACT WITH SKIN. CONTENTS MAY BE UNDER PRESSURE; CONTAINERS MAY RUPTURE VIOLENTLY AND TRAVEL A CONSIDERABLE DISTANCE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT.

WATER SPILL:

NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM BICARBONATE.

NEUTRALIZE WITH CAUSTIC SODA.

ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS; DO NOT PUT WATER DIRECTLY ON LEAK OR SPILL AREA. DO NOT GET WATER INSIDE

CONTAINER. ISOLATE AREA UNTIL GAS HAS DISPERSED. FOR SMALL SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY. STAY UPWIND, OUT OF LOW AREAS, AND VENTILATE CLOSED SPACES BEFORE ENTERING. ISOLATE THE LEAK OR SPILL AREA IMMEDIATELY FOR AT LEAST 150 FEET IN ALL DIRECTIONS.

REPORTABLE QUANTITY (RQ): 100 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

HYDROGEN FLUORIDE:

30 PPM- ANY SUPPLIED-AIR RESPIRATOR

ANY SELF-CONTAINED BREATHING APPARATUS.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH CARTRIDGE(S) PROVIDING PROTECTION AGAINST HYDROGEN FLUORIDE.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH CARTRIDGE(S) PROVIDING PROTECTION AGAINST HYDROGEN FLUORIDE.

ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST HYDROGEN FLUORIDE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN -STYLE OR FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST HYDROGEN FLUORIDE.

ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 01/26/85 REVISION DATE: 02/25/92

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IODINE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS11400

CAS#: 7553-56-2 FORMULA: I₂

IODINE IS A BLUE-VIOLET TO BLACK SOLID WITH A STRONG ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD BY ITSELF; HOWEVER, THE MATERIAL IS AN OXIDIZER. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE ALLERGIC REACTIONS AND BURNS OF THE NOSE, THROAT, SKIN, EYES, AND STOMACH AND TEARING. ADDITIONAL EFFECTS MAY INCLUDE COUGHING, RUNNY NOSE, METALLIC TASTE, HEADACHE, SLEEPINESS, NAUSEA, VOMITING, DIARRHEA, STOMACH PAIN, SEIZURES, LUNG CONGESTION, COLDNESS, FAINTING, BLUISH SKIN AND FINGERTIPS, AND POSSIBLE DEATH.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. CONTACT WITH FLAMMABLE OR COMBUSTIBLE MATERIALS MAY RESULT IN A FIRE OR EXPLOSION. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS11400

7553-56-2

IODINE

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MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7553-56-2
RTECS NUMBER: NN1575000

SUBSTANCE: IODINE

TRADE NAMES/SYNONYMS:

IODINE CRYSTALS; IODINE, SUBLIMED; IODINE A.R. CRYSTALS (MALLINCKRODT);
IODINE MOLECULE (I₂); MOLECULAR IODINE; DIATOMIC IODINE; DIIODINE; I₂;
OHS11400

CHEMICAL FAMILY:
HALOGEN

MOLECULAR FORMULA: I₂

MOLECULAR WEIGHT: 253.809

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: IODINE
CAS# 7553-56-2

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

IODINE:

0.1 PPM (1 MG/M³) OSHA CEILING
0.1 PPM (1 MG/M³) ACGIH CEILING
0.1 PPM (1 MG/M³) NIOSH RECOMMENDED CEILING
0.1 PPM (1 MG/M³) DFG MAK TWA;
0.2 PPM (2 MG/M³) DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: CHARCOAL TUBE; SODIUM CARBONATE; ION CHROMATOGRAPHY;
(NIOSH VOL. III # 6005).

PHYSICAL DATA

DESCRIPTION: BLUE-VIOLET TO BLACK CRYSTALS WITH A SHARP, CHARACTERISTIC ODOR.

BOILING POINT: 363 F (184 C) MELTING POINT: 237 F (114 C)

SPECIFIC GRAVITY: 4.93 VAPOR PRESSURE: 0.305 MMHG @ 25 C

SOLUBILITY IN WATER: 0.03% @ 20 C VAPOR DENSITY: 8.8

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, BENZENE, ETHER, CHLOROFORM, GLYCEROL, POTASSIUM IODIDE, CARBON DISULFIDE, IODIDE SOLUTIONS, PYRIDINE, QUINOLINE, AMINES, GLACIAL ACETIC ACID, CARBON TETRACHLORIDE.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER. CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:

WATER ONLY, NO DRY CHEMICAL, CARBON DIOXIDE OR HALON (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 45).

FLOOD WITH WATER. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS OR DUSTS. IF FIRE IS UNCONTROLLABLE, EVACUATE FOR A RADIUS OF 2500 FEET.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
OXIDIZER

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
OXIDIZER AND CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154

EXCEPTIONS: 49 CFR 173.153

TOXICITY

IODINE:

TOXICITY DATA: 800 MG/M3/1 HOUR INHALATION-RAT LCLO; 28 MG/KG ORAL-HUMAN LDLO; 26 MG/KG/1 YEAR INTERMITTENT ORAL-WOMAN TDLO; 14 GM/KG ORAL-RAT LD50; 22 GM/KG ORAL-MOUSE LD50; 10 GM/KG ORAL-RABBIT LD50; 800 MG/KG ORAL-DOG LDLO; 175 MG/KG SUBCUTANEOUS-RABBIT LDLO; 40 MG/KG INTRAVENOUS-DOG LDLO; 29 MG/KG UNREPORTED-MAN LDLO; REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.

ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INGESTION.

TARGET EFFECTS: SENSITIZER- DERMAL. POISONING MAY AFFECT THE CIRCULATORY SYSTEM AND KIDNEYS.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH IMPAIRED PULMONARY OR THYROID FUNCTION OR HISTORY OF ASTHMA, ALLERGIES OR KNOWN SENSITIZATION TO IODINE.

ADDITIONAL DATA: MAY CROSS REACT WITH IODOFORM, RADIOPAQUE IODINE AND IODIDES IN MEDICATIONS. MAY CROSS THE PLACENTA.*

* MAY BE BASED ON GENERAL INFORMATION ON IODINE COMPOUNDS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

IODINE:

CORROSIVE. 10 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION MAY CAUSE SEVERE IRRITATION OF THE MUCOUS MEMBRANES, SPARKLING BEFORE THE EYES, SEVERE COUGH, HEADACHE, SOMNOLENCE AND SWELLING OF THE PAROTID GLAND, AND POSSIBLY PULMONARY EDEMA. WORKERS EXPOSED TO IODINE VAPOR EXPERIENCED CATARRHAL RHINITIS, STOMATITIS, AND CHRONIC PHARYNGITIS. LABORATORY TECHNICIANS REPORTED HEADACHES, AND A FEELING OF TIGHTNESS IN THE CHEST FOLLOWING ACCIDENTAL EXPOSURE.

CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH CORROSIVE SUBSTANCES MAY CAUSE INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH AND POSSIBLY BRONCHIAL AND GASTROINTESTINAL DISTURBANCES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

IODINE:

CORROSIVE/SENSITIZER.

ACUTE EXPOSURE- MAY CAUSE BROWN DISCOLORATION OF THE SKIN WITH MARKED ERYTHEMA, DESQUAMATION AND VESICULATION WITH WEEPING AND

CRUSTING. THE LESIONS ARE COMMON AND ARE USUALLY ACNEFORM AND SLOW HEALING. SKIN ABSORPTION MAY OCCUR. DEATH HAS BEEN REPORTED AFTER APPLICATION OF IODINE TINCTURE TO ONE THIRD OF THE BODY SURFACE. ALTHOUGH IODINE IS A RARE SENSITIZER, THE HYPERSENSITIVITY REACTION MAY BE CHARACTERIZED BY DERMATITIS, FEVER, AND A GENERALIZED SKIN ERUPTION AND MAY PROVE FATAL.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE SENSITIZATION WITH DERMATITIS, LARYNGEAL EDEMA AND SERUM SICKNESS WITH LYMPH NODE ENLARGEMENT AND JOINT PAIN AND SWELLING.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

IODINE:

CORROSIVE.

ACUTE EXPOSURE- IN A HUMAN STUDY, ALL SUBJECTS COMPLAINED OF IRRITATION AFTER TWO MINUTES AT 1.63 PPM. IN ANOTHER STUDY, PATIENTS EXPOSED FOR 3-4 MINUTES TO SATURATED VAPOR EXPERIENCED BROWN STAINING OF THE CORNEAL EPITHELIUM, AND LOSS OF THE LAYER OF TISSUE WITH RECOVERY OCCURRING IN 2-3 DAYS. OCCUPATIONAL EXPOSURE TO IODINE VAPORS HAS BEEN REPORTED TO CAUSE A BURNING SENSATION, LACRIMATION AND BLEPHARITIS.

CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. CONJUNCTIVITIS OR EFFECTS AS DETAILED IN ACUTE EXPOSURE MAY OCCUR.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

IODINE:

CORROSIVE.

ACUTE EXPOSURE- INGESTION MAY CAUSE INFLAMMATION AND CORROSION OF THE GASTROINTESTINAL TRACT WITH BROWN DISCOLORATION OF THE LIPS AND MUCOUS MEMBRANES, A BURNING SENSATION, NAUSEA, SEVERE VOMITING, DIARRHEA, ABDOMINAL PAIN, INTENSE THIRST, METALLIC TASTE, FEVER, DELIRIUM AND STUPOR. RARELY, ULCERATIVE ESOPHAGITIS HAS BEEN REPORTED. LARGE DOSES MAY RESULT IN CONVULSIONS, HEMORRHAGIC NEPHRITIS, ANURIA AND SHOCK. ASPHYXIA FROM EDEMA OF THE EPIGLOTTIS, ASPIRATION, OR PULMONARY EDEMA MAY OCCUR. HYPERSENSITIVITY REACTIONS MAY OCCUR MANIFESTED BY ANGIONEUROTIC EDEMA, FEVER, ARTHRALGIA, LYMPHADENOPATHY, EOSINOPHILIA AND RARELY BY MULTIPLE PETECHIAE OF THE SKIN AND MUCOUS MEMBRANES. DEATH DUE TO CIRCULATORY COLLAPSE AND BRONCHOPNEUMONIA, UREMIA OR DELAYED ESOPHAGEAL AND PYLORIC STENOSIS HAVE BEEN REPORTED. THE MEDIAN LETHAL DOSE REPORTED IN MAN IS 2-4 GRAMS. PATHOLOGIC FINDINGS INCLUDE GLOMERULAR AND TUBULAR NECROSIS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION MAY CAUSE IODISM. THIS SYNDROME IS CHARACTERIZED BY A BURNING SENSATION IN THE MOUTH AND THROAT, BRASSY TASTE, GASTROINTESTINAL IRRITATION AND DIARRHEA,

SALIVATION, GINGIVITIS, SNEEZING, RHINITIS, RHINORRHEA, HEADACHE, FEVER, LARYNGITIS, PHARYNGITIS, BRONCHITIS, COUGH, STOMATITIS, PAROTITIS, EDEMA OF THE GLOTTIS, POSSIBLY PULMONARY EDEMA, SLEEPLESSNESS, TREMOR, TACHYCARDIA, NERVOUS SYMPTOMS, ANOREXIA, AND WEIGHT LOSS. VARIOUS SKIN RASHES INCLUDING VESICULAR, VEGETATIVE, MACULOPAPULAR, ACNE-FORM, BULLOUS ERUPTIONS AND POSSIBLY FATAL IODODERMA HAVE BEEN REPORTED. IN HYPERSENSITIVE INDIVIDUALS, IODISM MAY BE PRECIPITATED BY SMALL DOSES. LACRIMATION. EDEMA OF THE EYELIDS, AND CONJUNCTIVAL HYPERMIA MAY OCCUR. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- GIVE MILK, ABSORB REMAINING IODINE WITH STARCH SOLUTION MADE BY ADDING 15 GRAMS OF CORNSTARCH OR FLOUR TO 500 ML OF WATER. EMESIS AND LAVAGE ARE NOT INDICATED IN THE PRESENCE OF ESOPHAGEAL INJURY. GIVE MILK EVERY 15 MINUTES TO RELIEVE GASTRIC IRRITATION (DREISBACH, HANDBOOK OF POISONING, 12TH EDITION).

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

FOR IODINE AND IODINE-RELEASING COMPOUNDS (NOT IODIDE):

GIVE SODIUM THIOSULFATE, 100 ML OF 1% SOLUTION ORALLY, TO IMMEDIATELY REDUCE IODINE TO IODIDE (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

IODINE:

ACETALDEHYDE: VIOLENT REACTION.

ACETYLENE: EXPLOSIVE REACTION.

ALUMINUM (POWERED): VIOLENT REACTION IN THE PRESENCE OF MOISTURE.

AMMONIA OR SOME DERIVATIVES: MAY FORM EXPLOSIVE SALT.

BORON: SPONTANEOUS REACTION AT ELEVATED TEMPERATURES.

CESIUM OXIDE: INCANDESCENT REACTION AT ELEVATED TEMPERATURES.

DIPROPYLMERCURY: VIOLENT REACTION.

ETHANOL + PHOSPHOROUS: DANGEROUS REACTION.

FORMAMIDE, PYRIDINE + SULFUR TRIOXIDE: PROLONGED STORAGE MAY RESULT IN DANGEROUS BUILDUP OF PRESSURE IN A CLOSED CONTAINER.

HALOGENS AND INTERHALOGENS: IGNITE ON CONTACT.

LITHIUM SILICIDE: IGNITES ON HEATING.

MAGNESIUM: VIOLENT REACTION IN THE PRESENCE OF MOISTURE.

MERCURY(II) AMIDE CHLORIDE + ETHANOL: DELAYED EXPLOSION.

METAL ACETYLIDES: IGNITION OR INCANDESCENT REACTION AT ELEVATED OR AMBIENT TEMPERATURES.

METALS AND ALLOYS: EXOTHERMIC REACTION WITH POSSIBLE IGNITION OR EXPLOSION.

OXYGEN DIFLUORIDE: EXPLODES WHEN WARMED.

PHOSPHOROUS: IGNITION.

POLYACETYLENE: EXPLOSIVE DECOMPOSITION AT 113 C.
SILVER AZIDE + ETHER: FORMS HIGHLY EXPLOSIVE IODINE AZIDE.
SODIUM: FORMS SHOCK-SENSITIVE MIXTURE.
SODIUM HYDRIDE: INCANDESCENT REACTION.
SODIUM PHOSPHINATE: VIOLENT EXOTHERMIC REACTION AND IGNITION.
TETRAAMINECOPPER(II) SULFATE + ETHANOL: FORMS EXPLOSIVE COMPOUND.
TRIOXYGEN DIFLUORIDE: POSSIBLE IGNITION AND EXPLOSION.
ZINC: VIOLENT REACTION IN THE PRESENCE OF MOISTURE.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND HAZARDOUS IODINE VAPORS AND IODIDE FUMES.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

CONSULT NFPA PUBLICATION 43A, STORAGE OF LIQUID AND SOLID OXIDIZING MATERIALS, FOR STORAGE REQUIREMENTS.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). REACTION WITH FUELS MAY BE VIOLENT. FLAMMABLE POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT GET WATER INSIDE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER.

MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

IODINE:

1 PPM- ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

2.5 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS-FLOW MODE.

5 PPM- ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

10 PPM- ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS
OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ESCAPE- 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.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 09/28/84 REVISION DATE: 07/23/91

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IRON MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS11490

CAS#: 7439-89-6 FORMULA: FE

IRON IS A SILVER-WHITE OR GRAY METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, THIRST, FEVER, SWEATING, CHILLS, MUSCLE PAIN, METALLIC OR FOUL TASTE, NAUSEA, VOMITING, DIARRHEA, EYE DAMAGE, AND HEART FAILURE.

LONG TERM EXPOSURE: MAY CAUSE REDNESS AND SWELLING OF THE EYES AND LUNG DAMAGE.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS11490

7439-89-6

IRON

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OHS11490

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7439-89-6
RTECS NUMBER: NO4565500

SUBSTANCE: IRON

TRADE NAMES/SYNONYMS:

FERRIUM; IRON DUST; ARMCO IRON; LOHA; CARBONYL IRON;
I-60, I-61, I-62, I-185, I-57; FE; IRON MICROPOWDER GRADE S SERIES; OHS11490

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: FE

MOLECULAR WEIGHT: 55.85

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: IRON
CAS# 7439-89-6

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

IRON OXIDE DUST AND FUME (AS FE):
10 MG/M3 OSHA TWA (TOTAL PARTICULATE)
5 MG/M3 ACGIH TWA
5 MG/M3 NIOSH RECOMMENDED TWA (TOTAL PARTICULATE)
6 MG/M3 DFG MAK TWA (FINE DUST)

MEASUREMENT METHOD: PARTICULATE FILTER; X-RAY FLUORESCENCE SPECTROMETRY;
(NIOSH VOL. III # 7200, WELDING AND BRAZING FUME).

PHYSICAL DATA

DESCRIPTION: SILVER-WHITE OR GRAY, SOFT, MALLEABLE METAL.

BOILING POINT: 4982 F (2750 C) MELTING POINT: 2795 F (1535 C)

SPECIFIC GRAVITY: 7.86 VAPOR PRESSURE: 1 MMHG @ 1787 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN ACIDS; INSOLUBLE IN ALKALIES, ALCOHOL, ETHER.

BRINELL HARDNESS: 60

AUTOIGNITION TEMPERATURE: 428-968 F (220-520 C) (LAYER)

878-1436 F (470-780 C) (CLOUD)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154

EXCEPTIONS: 49 CFR 173.153

TOXICITY

IRON:

TOXICITY DATA: 77 MG/KG ORAL-CHILD TDLO; 30 GM/KG ORAL-RAT LD50; 20 GM/KG ORAL-GUINEA PIG LD50; 20 MG/KG INTRAPERITONEAL-RABBIT LDLO; TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: NONE. IRON AND STEEL FOUNDING: HUMAN SUFFICIENT EVIDENCE (IARC GROUP-1). THE CONSISTENCY OF THE EXCESS IN STUDIES FROM AROUND THE WORLD SHOWS THAT CERTAIN EXPOSURES IN IRON AND STEEL FOUNDING CAN CAUSE LUNG CANCER IN HUMANS. OTHER CANCER EXCESSES REPORTED HAVE INCLUDED LEUKEMIA, AND UROGENITAL AND DIGESTIVE SYSTEM CANCERS.

ACUTE TOXICITY LEVEL: RELATIVELY NON-TOXIC BY INGESTION.

TARGET EFFECTS: POISONING MAY AFFECT THE GASTROINTESTINAL, RESPIRATORY, NERVOUS AND HEMATOPOIETIC SYSTEMS AND THE LIVER.

HEALTH EFFECTS AND FIRST AID

INHALATION:

IRON:

ACUTE EXPOSURE- DUST MAY CAUSE MUCOUS MEMBRANE AND RESPIRATORY IRRITATION DUE TO MECHANICAL ACTION. METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED IRON OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST, AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES. LASSITUDE AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY CAUSE A MOTTLING OF THE LUNGS, A CONDITION CALLED SIDEROSIS WHICH IS CONSIDERED TO BE A BENIGN PNEUMOCONIOSIS THAT DOES NOT CAUSE SIGNIFICANT PHYSIOLOGIC IMPAIRMENT. SYMPTOMS MAY INCLUDE CHRONIC BRONCHITIS, EMPHYSEMA, AND DYSPNEA ON EXERTION.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

IRON:

ACUTE EXPOSURE- DUST MAY CAUSE IRRITATION. PENETRATION OF IRON PARTICLES IN THE SKIN MAY CAUSE AN EXOGENOUS SIDEROSIS WHICH MAY BE CHARACTERIZED BY A RED-BROWN PIGMENTATION OF THE AFFECTED AREA.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

IRON:

ACUTE EXPOSURE- MAY CAUSE IRRITATION DUE TO MECHANICAL ACTION. IRON PARTICLES IMBEDDED IN THE EYE MAY CAUSE OCULAR SIDEROSIS. EFFECTS MAY INCLUDE DISCOLORATION OF THE CORNEA AND IRIS, AND PUPILLARY EFFECTS INCLUDING POOR REACTION TO LIGHT, ACCOMODATION, AND ATROPINE. IF A PARTICLE ENTERS THE LENS THERE MAY BE CATARACT FORMATION. GLAUCOMA OCCURS RARELY IN SOME CASES OF OCULAR SIDEROSIS.

CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

IRON:

ACUTE EXPOSURE- THERE ARE NO REPORTS AVAILABLE ON POISONING FROM METALLIC IRON. THE PRINCIPAL MANIFESTATIONS OF POISONING WITH IRON COMPOUNDS ARE VOMITING, DIARRHEA, AND CIRCULATORY COLLAPSE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE HEMOSIDEROSIS, OR HEMOCHROMATOSIS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

IRON:

ACETALDEHYDE: POLYMERIZES READILY.

AMMONIUM NITRATE: VIOLENT OR EXPLOSIVE REACTION.

AMMONIUM PEROXODISULFATE: VIOLENT REACTION.

BROMINE PENTAFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

CHLORIC ACID: FORMS EXPLOSIVE COMPOUND.

CHLORINE (GAS): IGNITES.

CHLORINE TRIFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

CHLOROFORMAMIDIUM NITRATE: EXPLOSIVE IGNITION.

DINITROGEN TETRAOXIDE: IGNITES.

FLUORINE: IGNITES.

HYDROGEN PEROXIDE: VIOLENT DECOMPOSITION.

NITROGEN DIOXIDE: INCANDESCENT REACTION.

NITRYL FLUORIDE: INCANDESCES WHEN HEATED.

PHOSPHORUS: INCANDESCES WHEN HEATED.

POLYSTYRENE BEADS: POSSIBLE STATIC IGNITION.

POTASSIUM DICHROMATE: IGNITES ON CONTACT.

POTASSIUM PERCHLORATE + MANGANESE DIOXIDE: IGNITES.
SODIUM ACETYLIDE: POSSIBLE VIOLENT REACTION.
SODIUM PEROXIDE: IGNITES UNDER FRICTION @ 240 C.
SULFURIC ACID: POSSIBLE EXPLOSION HAZARD.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF IRON AND IRON FUMES.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.
VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED

THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/11/84 REVISION DATE: 01/23/92

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LANTHANUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS68991

CAS#: 7439-91-0 FORMULA: LA

LANTHANUM IS A WHITE TO DARK GREY METALLIC SOLID.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. MODERATE EXPLOSION HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

FOR SMALL FIRES: USE DRY CHEMICAL, SODA ASH, LIME OR SAND.

FOR LARGE FIRES: WITHDRAW FROM THE AREA AND LET FIRE BURN.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN AND EYES. ADDITIONAL EFFECTS MAY INCLUDE BLOOD EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, SENSITIVITY TO HEAT, ITCHING, AND INCREASED AWARENESS OF ODOR AND TASTE MAY OCCUR. MAY CAUSE TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT DANGEROUSLY WITH WATER AND AIR. MAY REACT DANGEROUSLY WITH OXIDIZERS, ACIDS, AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SPILL OR LEAK:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS68991
7439-91-0
LANTHANUM

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OHS68991

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: LANTHANUM

CAS NUMBER: 7439-91-0

TRADE NAMES/SYNONYMS:
LA; OHS68991

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: LA

MOLECULAR WEIGHT: 138.91

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=2 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=4 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: LANTHANUM
CAS# 7439-91-0

PERCENT: 100.0

OTHER CONTAMINANTS: NONE.

EXPOSURE LIMITS:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: MALLEABLE AND DUCTILE WHITE TO DARK GREY METALLIC METAL OR CHIPS
WHICH TARNISHES IN AIR. BOILING POINT: 6267-6269 F (3464-3465 C)

MELTING POINT: 1684-1690 F (918-921 C) SPECIFIC GRAVITY: 6.150

SOLUBILITY IN WATER: DECOMPOSES

SOLVENT SOLUBILITY: SOLUBLE IN MINERAL ACID; INSOLUBLE IN CONCENTRATED
SULFURIC ACID.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FINELY DIVIDED MATERIAL MAY IGNITE ON EXPOSURE TO AIR.

FIREFIGHTING MEDIA:

DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

EXTINGUISH USING AGENTS INDICATED. DO NOT GET WATER INSIDE CONTAINERS. AVOID BREATHING VAPORS FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

LANTHANUM:

CARCINOGEN STATUS: NONE.

ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.

TARGET EFFECTS: NO DATA AVAILABLE.

ADDITIONAL DATA: CALCIUM BLOCKER WHICH AFFECTS SARCOLEMAL ION CHANNELS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

LANTHANUM:

ACUTE EXPOSURE: MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- SOME RARE EARTHS MAY CAUSE LUNG GRANULOMAS. INHALATION OF RARE EARTHS IN HUMANS HAS CAUSED SENSITIVITY TO HEAT, ITCHING, AND AN INCREASED AWARENESS OF ODOR AND TASTE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

LANTHANUM:

ACUTE EXPOSURE- MAY CAUSE IRRITATION. SKIN ABSORPTION MAY OCCUR.

APPLICATION OF RARE EARTHS TO ABRADED SKIN MAY CAUSE EXTENSIVE INJURY RESULTING IN EPILATION AND SCAR FORMATION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

LANTHANUM:

ACUTE EXPOSURE- RARE EARTHS MAY IRRITATE THE CONJUNCTIVA. WHEN APPLIED TO DENUDED ANIMAL CORNEAS, OPACIFICATION HAS OCCURRED AFTER A LATENT PERIOD OF SEVERAL HOURS OR DAYS.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

LANTHANUM:

ACUTE EXPOSURE- THE ORAL TOXICITY OF THE RARE EARTHS IS LOW OWNING TO POOR GASTROINTESTINAL ABSORPTION. MAY DELAY BLOOD CLOTTING.

CHRONIC EXPOSURE- ANIMALS FED RARE EARTHS FOR SEVERAL MONTHS AT LEVELS UP TO 1% IN THE DIET, SHOWED NO HISTOLOGICAL OR GROWTH CHANGES AT THE LOWER LEVELS. HOWEVER, NONSPECIFIC LIVER DAMAGE WAS SEEN WITH SOME OF THE RARE EARTH COMPOUNDS TESTED AT 1%.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

LANTHANUM:

FINEY DIVIDED MATERIAL MAY IGNITE SPONTANEOUSLY IN AIR. MAY REACT WITH

WATER TO LIBERATE FLAMMABLE AND/OR EXPLOSIVE GAS.

INCOMPATIBILITIES:

LANTHANUM:

ACIDS (STRONG): INCOMPATIBLE.

BORON: INCOMPATIBLE.

CARBON: INCOMPATIBLE.

HALOGENS: BURNS VIGOROUSLY IN VAPORS ABOVE 392 F.

NITRIC ACID: VIOLENT REACTION ON OXIDIZATION

NITROGEN: INCOMPATIBLE.

OXIDIZER (STRONG): FIRE AND EXPLOSION HAZARD.

PHOSPHORUS: REACT VIOLENTLY AT 400-500 C.

SELENIUM: INCOMPATIBLE.

SILICON: INCOMPATIBLE.

SULFUR: INCOMPATIBLE.

DECOMPOSITION:

NONE HAZARDOUS.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AND HANDLE UNDER ARGON.

STORE IN A COOL, DRY PLACE; KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBERS, D001 AND D003.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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LEAD MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS12510

CAS#: 7439-92-1 FORMULA: PB

LEAD IS A BLUISH-WHITE, SILVERY GRAY METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. DUST-AIR MIXTURES MAY CATCH FIRE OR EXPLODE. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST OR POWDER MAY CAUSE IRRITATION OF THE SKIN AND EYES. ADDITIONAL EFFECTS MAY INCLUDE METALLIC TASTE, THIRST, DROOLING, DIFFICULTY BREATHING, CHILLS, FEVER, ABDOMINAL PAIN, VOMITING, BLOODY DIARRHEA OR CONSTIPATION, BLOOD IN URINE, NUMBNESS, WEAKNESS, PARALYSIS, SEIZURES, COLDNESS, FAINTING, BLUISH SKIN AND FINGERTIPS, AND POSSIBLE DEATH.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, AND NERVE, KIDNEY, AND HEART DAMAGE MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS12510
7439-92-1
LEAD

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OHS12510

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7439-92-1
RTECS NUMBER: OF7525000

SUBSTANCE: LEAD

TRADE NAMES/SYNONYMS:

C.I. PIGMENT METAL 4; C.I. 77575; LEAD FLAKE; KS-4; LEAD S 2; SI; SO;
PLUMBUM; SO; PB-S 100; LEAD ELEMENT; L-18; L-24; L-29; L-27; T-134;
40BP, 80BP, 100BP, 200BP, FP, SFP (SCM METAL PRODUCTS INC); PB;
LEAD GRANULES; OHS12510

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: PB

MOLECULAR WEIGHT: 207.19

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: LEAD PERCENT: 99.8
CAS# 7439-92-1

OTHER CONTAMINANTS: BISMUTH, COPPER, ARSENIC, ANTIMONY, TIN, IRON,
SILVER, ZINC

EXPOSURE LIMITS:

LEAD, INORGANIC FUMES AND DUST (AS PB):

50 UG/M3 OSHA 8 HOUR TWA

30 UG/M3 OSHA 8 HOUR TWA ACTION LEVEL

IF AN EMPLOYEE IS EXPOSED TO LEAD FOR MORE THAN 8 HOURS PER DAY THE
FOLLOWING FORMULA IS USED:

MAXIMUM PERMISSIBLE LIMIT (IN UG/M3)= 400 DIVIDED BY HOURS WORKED IN THE DAY

0.15 MG/M3 ACGIH TWA

<0.10 MG/M3 NIOSH RECOMMENDED 10 HOUR TWA

0.1 MG/M3 DFG MAK TWA;

1.0 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; NITRIC ACID/HYDROGEN PEROXIDE;

ATOMIC ABSORPTION SPECTROMETRY; (NIOSH VOL. III # 7082).

1 POUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (FEBRUARY 27, 1987)

PHYSICAL DATA

DESCRIPTION: BLUISH-WHITE, SILVERY GRAY, HEAVY, MALLEABLE METAL
BOILING POINT: 3164 F (1740 C) MELTING POINT: 622 F (328 C)
SPECIFIC GRAVITY: 11.3 VAPOR PRESSURE: 1.3 MMHG @ 970 C
SOLUBILITY IN WATER: INSOLUBLE
SOLVENT SOLUBILITY: SOLUBLE IN NITRIC ACID, HOT CONCENTRATED SULFURIC ACID
HARDNESS: 1.5 MOHS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD IN BULK FORM; HOWEVER, POSSIBLE FIRE AND EXPLOSION
HAZARD IN DUST FORM WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING
VAPORS OR DUSTS; KEEP UPWIND.

USE AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING HAZARDOUS
VAPORS, KEEP UPWIND.

TOXICITY

LEAD:
TOXICITY DATA: 10 UG/M3 INHALATION-HUMAN TCLO; 450 MG/KG/6 YEARS
ORAL WOMAN TDLO; 1000 MG/KG INTRAPERITONEAL-RAT LDLO; MUTAGENIC DATA
(RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL SUFFICIENT EVIDENCE
(IARC GROUP-2B FOR INORGANIC LEAD COMPOUNDS). RENAL TUMORS WERE PRODUCED IN

ANIMALS BY LEAD ACETATE, SUBACETATE AND PHOSPHATE GIVEN ORALLY, SUBCUTANEOUSLY OR INTRAPERITONEALLY. NO EVALUATION COULD BE MADE OF THE CARCINOGENICITY OF POWDERED LEAD.

ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.

TARGET EFFECTS: NEUROTOXIN; NEPHROTOXIN; TERATOGEN. POISONING MAY ALSO AFFECT THE BLOOD, HEART, ENDOCRINE, AND IMMUNE SYSTEMS.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH NERVOUS SYSTEM OR GASTROINTESTINAL DISORDERS, ANEMIA, OR CHRONIC BRONCHITIS.

ADDITIONAL DATA: MAY CROSS THE PLACENTA. SMOKING MAY RESULT IN HIGH BLOOD LEAD LEVELS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

LEAD:

SEE INFORMATION ON LEAD COMPOUNDS AND METAL FUME FEVER.

LEAD COMPOUNDS:

NEUROTOXIN/NEPHROTOXIN/TERATOGEN.

ACUTE EXPOSURE- ABSORPTION OF LARGE AMOUNTS OF LEAD MAY CAUSE A METALLIC TASTE, THIRST, A BURNING SENSATION IN THE MOUTH AND THROAT, SALIVATION, ABDOMINAL PAIN WITH SEVERE COLIC, VOMITING, DIARRHEA OF BLACK OR BLOODY STOOLS, CONSTIPATION, FATIGUE, SLEEP DISTURBANCES, DULLNESS, RESTLESSNESS, IRRITABILITY, MEMORY LOSS, LOSS OF CONCENTRATION, DELIRIUM, OLIGURIA OFTEN WITH HEMATURIA AND ALBUMINURIA, ENCEPHALOPATHY WITH VISUAL FAILURE, PARESTHESIAS, MUSCLE PAIN AND WEAKNESS, CONVULSIONS, AND PARALYSIS. DEATH MAY RESULT FROM CARDIORESPIRATORY ARREST OR SHOCK. SURVIVORS OF ACUTE EXPOSURE MAY EXPERIENCE THE ONSET OF CHRONIC INTOXICATION. LIVER EFFECTS MAY INCLUDE ENLARGEMENT AND TENDERNESS, AND JAUNDICE. THE FATAL DOSE OF ABSORBED LEAD IS APPROXIMATELY 0.5 GRAMS. PATHOLOGICAL FINDINGS INCLUDE GASTROINTESTINAL INFLAMMATION AND RENAL TUBULAR DEGENERATION.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO LOW LEVELS OF LEAD MAY RESULT IN AN ACCUMULATION IN BODY TISSUES AND EXERT ADVERSE EFFECTS ON THE BLOOD, NERVOUS SYSTEMS, HEART, ENDOCRINE AND IMMUNE SYSTEMS, KIDNEYS, AND REPRODUCTION. EARLY STAGES OF LEAD POISONING, "PLUMBISM", MAY BE EVIDENCED BY ANOREXIA, WEIGHT LOSS, CONSTIPATION, APATHY OR IRRITABILITY, OCCASIONAL VOMITING, FATIGUE, HEADACHE, WEAKNESS, METALLIC TASTE IN THE MOUTH, GINGIVAL LEAD LINE IN PERSONS WITH POOR DENTAL HYGIENE, AND ANEMIA. LOSS OF RECENTLY DEVELOPED MOTOR SKILLS IS GENERALLY OBSERVED ONLY IN CHILDREN. MORE ADVANCED STAGES OF POISONING MAY BE CHARACTERIZED BY INTERMITTENT VOMITING, IRRITABILITY AND NERVOUSNESS, MYALGIA OF THE ARMS, LEGS, JOINTS AND ABDOMEN, PARALYSIS OF THE EXTENSOR MUSCLES OF THE ARMS AND LEGS WITH WRIST AND/OR FOOT DROP. SEVERE "PLUMBISM" MAY RESULT IN PERSISTENT VOMITING, ATAXIA, PERIODS OF STUPOR OR LETHARGY, ENCEPHALOPATHY WITH VISUAL DISTURBANCES WHICH MAY PROGRESS TO OPTIC NEURITIS AND ATROPHY, HYPERTENSION, PAPILLEDEMA, CRANIAL NERVE PARALYSIS, DELIRIUM, CONVULSIONS, AND COMA. NEUROLOGIC SEQUELAE MAY INCLUDE MENTAL RETARDATION, SEIZURES, CEREBRAL PALSY, AND DYSTONIA MUSCULORUM DEFORMANS. IRREVERSIBLE KIDNEY DAMAGE HAS BEEN ASSOCIATED WITH INDUSTRIAL EXPOSURE. REPRODUCTIVE EFFECTS HAVE BEEN EXHIBITED IN BOTH MALES AND FEMALES. PATERNAL EFFECTS MAY INCLUDE DECREASED SEX DRIVE, IMPOTENCE, STERILITY AND ADVERSE EFFECTS ON THE SPERM WHICH MAY INCREASE THE RISK OF BIRTH DEFECTS. MATERNAL EFFECTS MAY INCLUDE MISCARRIAGE AND STILLBIRTHS IN EXPOSED WOMEN OR WOMEN WHOSE

HUSBANDS WERE EXPOSED, ABORTION, STERILITY OR DECREASED FERTILITY, AND ABNORMAL MENSTRUAL CYCLES. LEAD CROSSES THE PLACENTA AND MAY AFFECT THE FETUS CAUSING BIRTH DEFECTS, MENTAL RETARDATION, BEHAVIORAL DISORDERS, AND DEATH DURING THE FIRST YEAR OF CHILDHOOD. ANIMAL STUDIES INDICATE THAT REPRODUCTIVE EFFECTS MAY BE ADDITIVE IF BOTH PARENTS ARE EXPOSED TO LEAD.

METAL FUME FEVER:

ACUTE EXPOSURE- METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED METAL OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST, AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS.

CHRONIC EXPOSURE- THERE IS NO FORM OF CHRONIC METAL FUME FEVER, HOWEVER, REPEATED BOUTS WITH SYMPTOMS AS DESCRIBED ABOVE ARE QUITE COMMON. RESISTANCE TO THE CONDITION DEVELOPS AFTER A FEW DAYS OF EXPOSURE, BUT IS QUICKLY LOST IN 1 OR 2 DAYS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

LEAD:

SEE INFORMATION ON LEAD COMPOUNDS.

LEAD COMPOUNDS:

ACUTE EXPOSURE- CONTACT WITH LEAD POWDERS OR DUST MAY BE IRRITATING. LEAD IS NOT ABSORBED THROUGH THE SKIN, BUT MAY BE TRANSFERRED TO THE MOUTH INADVERTENTLY BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO THE POWDER OR DUST MAY RESULT IN DERMATITIS. SYSTEMIC TOXICITY MAY DEVELOP IF LEAD IS TRANSFERRED TO THE MOUTH BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.

FIRST AID- 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.

EYE CONTACT:

LEAD:

SEE INFORMATION ON LEAD COMPOUNDS.

LEAD COMPOUNDS:

ACUTE EXPOSURE- LEAD DUST OR POWDERS MAY BE IRRITATING. METALLIC LEAD PARTICLES MAY CAUSE AN INFLAMMATORY FOREIGN BODY REACTION AND INJURY IS GENERALLY THOUGHT TO BE MECHANICAL AND NOT TOXIC.

CHRONIC EXPOSURE- PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

LEAD:

SEE INFORMATION ON LEAD COMPOUNDS.

LEAD COMPOUNDS:

NEUROTOXIN/NEPHROTOXIN/TERATOGEN.

ACUTE EXPOSURE- ABSORPTION OF LARGE AMOUNTS OF LEAD FROM THE INTESTINAL TRACT MAY CAUSE ALL THE SAME EFFECTS AS DETAILED IN ACUTE INHALATION. THE FATAL DOSE OF ABSORBED LEAD IS APPROXIMATELY 0.5 GRAMS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO LOW LEVELS OF LEAD MAY RESULT IN AN ACCUMULATION IN BODY TISSUES AND ADVERSE EFFECTS ON THE KIDNEYS, HEART AND BLOOD AND ON THE NERVOUS, REPRODUCTIVE, ENDOCRINE AND IMMUNE SYSTEMS AS DETAILED IN CHRONIC INHALATION.

FIRST AID- DO NOT INDUCE VOMITING. QUALIFIED MEDICAL PERSONNEL SHOULD REMOVE CHEMICAL BY GASTRIC LAVAGE OR CATHARSIS. ACTIVATED CHARCOAL IS USEFUL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

FOR LEAD POISONING:

INITIATE URINE FLOW FIRST. GIVE 10% DEXTROSE IN WATER INTRAVENOUSLY, 10-20 ML/KG BODY WEIGHT, OVER A PERIOD OF 1-2 HOURS. IF URINE FLOW DOES NOT START, GIVE MANNITOL, 20% SOLUTION, 5-10 ML/KG BODY WEIGHT INTRAVENOUSLY OVER 20 MINUTES. FLUID MUST BE LIMITED TO REQUIREMENTS AND CATHETERIZATION MAY BE NECESSARY IN COMA. DAILY URINE OUTPUT SHOULD BE 350-500 ML/M²/24 HOURS. EXCESSIVE FLUIDS FURTHER INCREASE CEREBRAL EDEMA.

FOR ADULTS WITH ACUTE ENCEPHALOPATHY, GIVE DIMERCAPROL, 4 MG/KG, INTRAMUSCULARLY EVERY 4 HOURS FOR 30 DOSES. BEGINNING 4 HOURS LATER, GIVE CALCIUM DISODIUM EDETATE AT A SEPERATE INJECTION SITE, 12.5 MG/KG INTRAMUSCULARLY EVERY 4 HOURS AS A 20% SOLUTION, WITH 0.5% PROCAINE ADDED, FOR A TOTAL OF 30 DOSES. IF SIGNIFICANT IMPROVEMENT HAS NOT OCCURRED BY THE FOURTH DAY, INCREASE THE NUMBER OF INJECTIONS BY 10 FOR EACH DRUG.

FOR SYMPTOMATIC ADULTS, THE COURSE OF DIMERCAPROL AND CALCIUM DISODIUM EDETATE CAN BE SHORTENED OR CALCIUM DISODIUM EDETATE ONLY CAN BE GIVEN IN A DOSAGE OF 50 MG/KG INTRAVENOUSLY AS 0.5% SOLUTION IN 5% DEXTROSE IN WATER OR NORMAL SALINE BY INFUSION OVER NOT LESS THAN 8 HOURS FOR NOT MORE THAN 5 DAYS. FOLLOW WITH PENICILLAMINE, 500-750 MG/DAY, ORALLY FOR 1-2 MONTHS OR UNTIL URINE LEAD LEVELS DROPS BELOW 0.3 MG/24 HOURS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

LEAD:

AMMONIUM NITRATE: VIOLENT OR EXPLOSIVE REACTION.
CHLORINE TRIFLUORIDE: VIOLENT REACTION.
DISODIUM ACETYLIDE: TRITURATION IN MORTAR MAY BE VIOLENT AND LIBERATE CARBON.
HYDROGEN PEROXIDE (52% OR GREATER): VIOLENT DECOMPOSITION.
HYDROGEN PEROXIDE (60% SOLUTION) AND TRIOXANE: SPONTANEOUSLY DETONABLE.
METALS (ACTIVE): INCOMPATIBLE.
NITRIC ACID: LEAD-CONTAINING RUBBER MAY IGNITE.
OXIDIZERS (STRONG): INCOMPATIBLE.
SODIUM AZIDE: FORMS LEAD AZIDE AND COPPER AZIDE IN COPPER PIPE.
SODIUM CARBIDE: VIGOROUS REACTION.
SULFURIC ACID (HOT): REACTS.
ZIRCONIUM-LEAD ALLOYS: IGNITION ON IMPACT.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS ARE TOXIC OXIDES OF LEAD.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

LEAD - REGULATORY LEVEL: 5.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D008.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. PREVENT DISPERSION OF DUST IN AIR. DO NOT ALLOW SPILLED MATERIAL TO CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

WATER SPILL:

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

REPORTABLE QUANTITY (RQ): 1 POUND

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

LEAD (ELEMENTAL, INORGANIC, AND SOAPS):

VENTILATION SHOULD MEET THE REQUIREMENTS IN 29 CFR 1910.1025(E).

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR 1910, SUBPART Z.

RESPIRATORY PROTECTION FOR LEAD AEROSOLS

AIRBORNE CONCENTRATION OF LEAD OR
CONDITION OF USE

REQUIRED RESPIRATOR

NOT IN EXCESS OF 0.5 MG/M3 (10X PEL)

HALF-MASK, AIR PURIFYING
RESPIRATOR EQUIPPED WITH
HIGH-EFFICIENCY FILTERS.

NOT IN EXCESS OF 2.5 MG/M3 (50X PEL)

FULL FACEPIECE, AIR-PURIFYING
RESPIRATOR WITH HIGH EFFICIENCY
FILTERS.

NOT IN EXCESS OF 50 MG/M3 (1000X PEL)

ANY POWERED AIR-PURIFYING
RESPIRATOR WITH HIGH EFFICIENCY
FILTERS;

OR

HALF-MASK SUPPLIED-AIR RESPIRATOR
OPERATED IN POSITIVE-PRESSURE
MODE.

NOT IN EXCESS OF 100 MG/M3

SUPPLIED-AIR RESPIRATORS WITH
FULL FACEPIECE, HOOD OR HELMET OR
SUIT, OPERATED IN POSITIVE
PRESSURE MODE.

GREATER THAN 100 MG/M3, UNKNOWN
CONCENTRATIONS OR FIREFIGHTING

FULL FACEPIECE, SELF-CONTAINED
BREATHING APPARATUS OPERATED IN
POSITIVE-PRESSURE MODE.

(RESPIRATORS SPECIFIED FOR HIGHER CONCENTRATIONS CAN BE USED AT LOWER
CONCENTRATIONS OF LEAD).

(FULL FACEPIECE IS REQUIRED IF THE LEAD AEROSOLS CAUSE EYE OR SKIN IRRITATION
AT THE USE CONCENTRATIONS.)

(A HIGH EFFICIENCY PARTICULATE FILTER MEANS 99.97% EFFICIENT AGAINST 0.3
MICRON PARTICLES.)

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.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND
IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF
OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

LEAD, INORGANIC FUMES AND DUSTS (AS PB):

0.50 MG(PB)/M3- ANY SUPPLIED-AIR RESPIRATOR.

ANY AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY
PARTICULATE FILTER.

ANY SELF-CONTAINED BREATHING APPARATUS.

1.25 MG(PB)/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY
PARTICULATE FILTER.

ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW
MODE.

2.50 MG(PB)/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING
FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL
FACEPIECE.

ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE
OPERATED IN A CONTINUOUS FLOW MODE.

50.0 MG(PB)/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A PRESSURE-DEMAND
OR OTHER POSITIVE PRESSURE MODE.

100.0 MG(PB)/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

LEAD (ELEMENTAL, INORGANIC, AND SOAPS):

PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1025(G).

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

LEAD (ELEMENTAL, INORGANIC & SOAPS):

PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1025(G).

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

LEAD (ELEMENTAL, INORGANIC, AND SOAPS):

PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1025(G).

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LITHIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS12840

CAS#: 7439-93-2 FORMULA: LI

LITHIUM IS A SILVER-WHITE METAL.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. DANGEROUS EXPLOSION HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO PUT OUT THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, SKIN, EYES, MOUTH, AND STOMACH. ADDITIONAL EFFECTS MAY INCLUDE COUGHING, CHOKING, DIFFICULTY SWALLOWING AND SPEAKING, DROOLING, VOMITING BLOOD, AND DIARRHEA.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, MOUTH SORES, NAUSEA, AND LUNG EFFECTS MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ALL WET CLOTHING OR SHOES. WIPE THE SUBSTANCE FROM THE SKIN. WASH EXPOSED PARTS WITH FLOODING AMOUNTS OF WATER AND SOAP. FLUSH EYES WITH FLOODING AMOUNTS OF WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

FINELY DIVIDED METAL MAY CATCH FIRE IN AIR. REACTS WITH WATER TO FORM CORROSIVE SUBSTANCES WHICH MAY CATCH FIRE OR EXPLODE IN AIR. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS12840

7439-93-2

LITHIUM

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OHS12840

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7439-93-2
RTECS NUMBER: OJ5540000

SUBSTANCE: LITHIUM

TRADE NAMES/SYNONYMS:

LITHIUM METAL; LITHIUM ELEMENT; STCC 4916428; UN 1415; L-111; LI; OHS12840

CHEMICAL FAMILY:

METAL

MOLECULAR FORMULA: LI

MOLECULAR WEIGHT: 6.941

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=3 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=1 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: LITHIUM
CAS# 7439-93-2

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: SOFT, SILVER-WHITE METAL. BOILING POINT: 2448 F (1342 C)

MELTING POINT: 358 F (181 C) SPECIFIC GRAVITY: 0.534

VAPOR PRESSURE: 0.49 MMHG @ 702 C SOLUBILITY IN WATER: REACTS

SOLVENT SOLUBILITY: SOLUBLE IN LIQUID AMMONIA, ACIDS, ALCOHOL.

MOHS HARDNESS: 0.6

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

FINELY DIVIDED METAL MAY IGNITE IN AIR AT AMBIENT TEMPERATURE, AND MASSIVE METAL AT TEMPERATURES ABOVE THE MELTING POINT, ESPECIALLY IF OXIDE OR NITRIDE IS PRESENT. SINCE LITHIUM WILL BURN IN OXYGEN, NITROGEN, OR CARBON DIOXIDE, AND MAY REACT WITH SAND, SODIUM CARBONATE, ETC., IT IS DIFFICULT TO EXTINGUISH ONCE ALIGHT.

FIREFIGHTING MEDIA:

USE DRY DOLOMITE, DRY GRAPHITE POWDER, OR APPROPRIATE DRY METAL-EXTINGUISHING POWDER. DO NOT USE WATER OR HALOGENATED HYDROCARBONS. IN CLOSED SYSTEMS USE ARGON OR HELIUM ATMOSPHERES. (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION; NFPA 49, HAZARDOUS CHEMICALS DATA 1975).

FIREFIGHTING:

DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

EXTINGUISH USING AGENTS INDICATED. DO NOT USE WATER. AVOID BREATHING DUSTS AND FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.206
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
LITHIUM-UN 1415

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:

PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
DANGEROUS WHEN WET

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: NONE

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 50 KG

TOXICITY

LITHIUM:
325 MG/M3 INTRAVENOUS-DOG LDLO (THIDD6); 4000 MG/KG SUBCUTANEOUS-RABBIT LDLO (THIDD6); 1 GM/KG INTRAPERITONEAL-MOUSE LD50; MUTAGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
LITHIUM IS A SEVERE SKIN, EYE AND MUCOUS MEMBRANE IRRITANT. POISONING MAY AFFECT THE KIDNEYS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
LITHIUM:
CORROSIVE.

ACUTE EXPOSURE- ON CONTACT WITH MOISTURE, LITHIUM RELEASES FLAMMABLE HYDROGEN GAS AND LITHIUM HYDROXIDE WHICH IS CORROSIVE. INHALATION OF CORROSIVE SUBSTANCES MAY CAUSE SYMPTOMS OF RESPIRATORY TRACT IRRITATION POSSIBLY INCLUDING COUGHING, CHOKING, PAIN IN THE NOSE, MOUTH AND THROAT AND BURNS OF THE MUCOUS MEMBRANES. IF SUFFICIENT QUANTITIES ARE INHALED, PULMONARY EDEMA MAY DEVELOP, OFTEN WITH A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE TIGHTNESS IN THE CHEST, DYSPNEA, FROTHY SPUTUM, CYANOSIS, AND DIZZINESS. PHYSICAL FINDINGS MAY INCLUDE WEAK, RAPID PULSE, HYPOTENSION, HEMOCONCENTRATION AND MOIST RALES.
CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED EXPOSURE TO CORROSIVE SUBSTANCES MAY CAUSE INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH AND POSSIBLY BRONCHIAL AND GASTROINTESTINAL DISTURBANCES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

LITHIUM:
CORROSIVE.

ACUTE EXPOSURE- ON CONTACT WITH MOISTURE, LITHIUM RELEASES FLAMMABLE HYDROGEN GAS AND LITHIUM HYDROXIDE WHICH IS CORROSIVE. DIRECT CONTACT WITH ALKALINE SUBSTANCES MAY CAUSE SEVERE PAIN, BURNS AND POSSIBLY BROWNISH STAINS. THE CORRODED AREAS ARE SOFT, GELATINOUS AND NECROTIC AND THE TISSUE DESTRUCTION MAY BE DEEP.

CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH ALKALINE SUBSTANCES MAY CAUSE DERMATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
LITHIUM:
CORROSIVE.

ACUTE EXPOSURE- ON CONTACT WITH MOISTURE, LITHIUM RELEASES FLAMMABLE HYDROGEN GAS AND LITHIUM HYDROXIDE WHICH IS CORROSIVE. DIRECT CONTACT WITH ALKALINE SUBSTANCES MAY CAUSE PAIN AND BURNS, POSSIBLY SEVERE. THE DEGREE OF INJURY DEPENDS ON THE CONCENTRATION AND DURATION OF CONTACT. THERE MAY BE EDEMA, DESTRUCTION OF EPITHELIUM, CORNEAL OPACIFICATION, AND IRITIS. WHEN DAMAGE IS LESS THAN EXCESSIVE, THESE SYMPTOMS TEND TO AMELIORATE. IN SEVERE BURNS, THE FULL EXTENT OF THE INJURY MAY NOT BE IMMEDIATELY APPARENT. LATE COMPLICATIONS MAY INCLUDE PERSISTENT EDEMA, VASCULARIZATION AND SCARRING OF THE CORNEA, PERMANENT OPACITY, STAPHYLOMA, CATARACT, AND SYMBLEPHARON.

CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH ALKALINE SUBSTANCES MAY RESULT IN CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
LITHIUM:
CORROSIVE.

ACUTE EXPOSURE- ORAL ADMINISTRATION TO ANIMALS HAS PRODUCED ANOREXIA, NAUSEA, VOMITING, DIARRHEA, SALIVATION, WEIGHT LOSS, TEMPERATURE DROP, AND BODY WATER LOSS. ON CONTACT WITH MOISTURE, LITHIUM RELEASES FLAMMABLE HYDROGEN GAS AND LITHIUM HYDROXIDE WHICH IS CORROSIVE. ALKALINE SUBSTANCES MAY CAUSE IMMEDIATE PAIN AND CIRCUMORAL BURNS AND CORROSION OF THE MUCOUS MEMBRANES WHICH AT FIRST TURN WHITE AND SOAPY AND THEN BECOME BROWN, EDEMATOUS AND ULCERATED. THERE MAY BE PROFUSE SALIVATION. SWALLOWING AND SPEECH MAY BE DIFFICULT AT FIRST AND THEN ALMOST IMPOSSIBLE. EVEN WHEN THERE IS NO EVIDENCE OF ORAL BURNS, THE ESOPHAGUS AND STOMACH MAY BE INVOLVED WITH BURNING PAIN, VOMITING AND DIARRHEA. THE VOMITUS MAY BE THICK AND SLIMY WITH MUCUS, AND LATER

CONTAIN BLOOD AND SHREDS OF MUCOUS MEMBRANE. EPIGLOTTAL EDEMA MAY RESULT IN RESPIRATORY DISTRESS AND POSSIBLY ASPHYXIA. SHOCK WITH MARKED HYPOTENSION, WEAK AND RAPID PULSE, SHALLOW RESPIRATION, AND CLAMMY SKIN MAY OCCUR. CIRCULATORY COLLAPSE MAY ENSUE AND IF UNCORRECTED, LEAD TO RENAL FAILURE. IN SEVERE CASES, ESOPHAGEAL OR GASTRIC PERFORATION ARE POSSIBLE AND MAY BE ACCOMPANIED BY MEDIASTITIS, SUBSTERNAL PAIN, PERITONITIS, ABDOMINAL RIGIDITY, AND FEVER. ESOPHAGEAL, AND POSSIBLY GASTRIC OR PYLORIC STRICTURE MAY OCCUR WITHIN A FEW WEEKS, BUT MAY BE DELAYED FOR MONTHS OR EVEN YEARS. DEATH MAY RESULT WITHIN A SHORT TIME FROM ASPHYXIA, CIRCULATORY COLLAPSE, OR ASPIRATION OF EVEN MINUTE AMOUNTS. LATER DEATH MAY BE DUE TO THE COMPLICATIONS OF PERFORATION, PNEUMONIA, OR THE EFFECTS OF STRICTURE FORMATION.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION OF ALKALINE SUBSTANCES MAY RESULT IN INFLAMMATORY AND ULCERATIVE EFFECTS ON THE ORAL MUCOUS MEMBRANES AND OTHER EFFECTS AS WITH ACUTE INGESTION.

FIRST AID- DILUTE THE ALKALI BY GIVING WATER OR MILK IMMEDIATELY AND ALLOW VOMITING TO OCCUR. AVOID GASTRIC LAVAGE OR EMETICS. ESOPHAGOSCOPY IS THE ONLY WAY TO EXCLUDE THE POSSIBILITY OF CORROSION IN THE UPPER GASTROINTESTINAL TRACT; IF CORROSION IS SUSPECTED, ESOPHAGOSCOPY SHOULD USUALLY BE PERFORMED WITHIN 24 HOURS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). MAINTAIN AIRWAY AND TREAT SHOCK. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

FINELY DIVIDED METAL MAY IGNITE IN AIR AT AMBIENT TEMPERATURES AND MASSIVE METAL ABOVE THE MELTING POINT OF 180 C. WILL IGNITE IN AIR, OXYGEN, NITROGEN, AND CARBON DIOXIDE. REACTS WITH WATER TO FORM LITHIUM HYDROXIDE AND HYDROGEN GAS WHICH MAY FORM EXPLOSIVE MIXTURES WITH AIR.

INCOMPATIBILITIES:

LITHIUM:

ACETONITRILE: EXOTHERMIC REACTION.

ACIDS: VIOLENT REACTION.

ARSENIC (HEATED): VIOLENT REACTION.

BERYLLIUM: ATTACKS AT 180 C.

BROMINE: FORMS IMPACT-SENSITIVE MIXTURE.

BROMINE PENTAFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

BROMOBENZENE: VIGOROUS REACTION WITH POSSIBLE EXPLOSION.

BROMOFORM: EXPLODES ON IMPACT.

CARBIDES: ATTACKS.

CARBON, LITHIUM TETRACHLOROALUMINATE AND SULFINYL CHLORIDE: IGNITION OR EXPLOSION IF GREATER THAN 10% CARBON PRESENT.

CARBON + SULFINYL CHLORIDE: MAY IGNITE IF LITHIUM PREGROUND WITH CARBON.

CARBON DIOXIDE: IGNITES.

CARBON MONOXIDE: FORMS LITHIUM CARBONYL WHICH DETONATES VIOLENTLY WITH WATER.

CARBON TETRABROMIDE: POSSIBLE EXPLOSION BY IMPACT.

CARBON TETRACHLORIDE: POSSIBLE EXPLOSION.
 CHLORINE (VAPOR): REACTS WITH LUMINOUS FLAME.
 CHLOROFORM: MAY EXPLODE ON IMPACT.
 CHROMIC OXIDE: REACTION OCCURS AROUND 180 C WITH TEMPERATURE RISE TO 965 C.
 CHROMIUM: MOLTEN LITHIUM @ 180 C ATTACKS CHROMIUM SEVERELY.
 CHROMIUM TRICHLORIDE: BURNS VIGOROUSLY IN NITROGEN ATMOSPHERE.
 COBALT ALLOYS: MOLTEN LITHIUM ATTACKS COBALT ALLOYS.
 DIAZOMETHANE: POSSIBLE EXPLOSION.
 DIBORANE: IGNITION.
 ETHYLENE: INCANDESCES.
 FERROUS SULFIDE: REACTION OCCURS @ 180 C WITH CONSEQUENT TEMPERATURE INCREASE TO 945 C.
 HALOCARBONS: POSSIBLE IGNITION BY IMPACT.
 HALOGENS: VIOLENT EXOTHERMIC REACTIONS OR POSSIBLE EXPLOSION.
 HYDROGEN: LITHIUM BURNS IN GASEOUS HYDROGEN.
 IODINE: EXOTHERMIC REACTION ABOVE 200 C.
 IODOFORM: THE MIXTURE CAN EXPLODE ON IMPACT.
 IRON ALLOYS: MOLTEN LITHIUM ATTACKS IRON ALLOYS.
 MALEIC ANHYDRIDE: EXPLOSIVE DECOMPOSITION.
 MANGANESE ALLOYS: MOLTEN LITHIUM ATTACKS MANGANESE ALLOYS.
 MERCURY: VIOLENT EXOTHERMIC REACTION OR POSSIBLE EXPLOSION.
 METAL OXIDES: INTENSE EXOTHERMIC REACTION.
 METHYL DICHLORIDE: THE MIXTURE CAN EXPLODE ON IMPACT.
 METHYL DIIODIDE: THE MIXTURE CAN EXPLODE ON IMPACT.
 MOLYBDENUM TRIOXIDE: THE REACTION OCCURS @ 180 C WITH CONSEQUENT TEMPERATURE RISE TO 1400 C.
 MONOFLUOROTRICHLOROMETHANE: POSSIBLE EXPLOSION.
 NICKEL ALLOYS: MOLTEN LITHIUM ATTACKS NICKEL ALLOYS.
 NIOBIUM PENTAOXIDE: THE REACTION OCCURS @ 320 C WITH CONSEQUENT TEMPERATURE RISE TO 490 C.
 NITRIC ACID: IGNITION.
 NITROGEN: IGNITION.
 OXYGEN: IGNITION.
 PHOSPHORUS: VIOLENT REACTION WITH STRONGLY HEATED PHOSPHORUS.
 PLASTICS: ATTACKS.
 PLATINUM: VIOLENT REACTION @ 550 C.
 POLY(1,1-DIFLUOROETHYLENE-HEXAFLUOROPYLENE)(VITON): IGNITION BY HEATING.
 RUBBER: ATTACKS.
 SILICATES: MOLTEN LITHIUM ATTACKS SILICATES.
 SODIUM CARBONATE: VIOLENT REACTION.
 SODIUM CHLORIDE: VIOLENT REACTION.
 SODIUM NITRITE: FORMATION OF LITHIUM SODIUM HYPONITRITE WHICH DECOMPOSES VIOLENTLY AROUND 100-130 C.
 SULFUR: EXPLOSIVE REACTION.
 TANTALUM PENTOXIDE: THE REACTION OCCURS AROUND 410 C WITH CONSEQUENT TEMPERATURE RISE TO 595 C.
 TETRACHLOROETHYLENE: FORMATION OF EXPLOSIVE MIXTURE.
 TRICHLOROETHYLENE: FORMATION OF EXPLOSIVE MIXTURE.
 TRICHLOROTRIFLUOROETHANE: FORMATION OF EXPLOSIVE MIXTURE.
 TRIFLUOROMETHYL HYPOFLUORITE: VIOLENT EXOTHERMIC REACTION.
 TUNGSTEN TRIOXIDE: THE REACTION OCCURS @ 200 C WITH SUBSEQUENT TEMPERATURE RISE TO 1030 C.
 VANADIUM: MOLTEN LITHIUM ATTACKS VANADIUM SEVERELY.
 VANADIUM PENTOXIDE: THE REACTION OCCURS @ 400 C WITH SUBSEQUENT RISE IN

TEMPERATURE TO 768 C.
ZIRCONIUM TETRACHLORIDE AND NITROGEN: VIOLENT COMBUSTION BY HEATING.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND CORROSIVE LITHIUM HYDRIDE AND FLAMMABLE HYDROGEN GAS.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORAGE: PROTECT CONTAINERS AGAINST PHYSICAL DAMAGE. KEEP AWAY FROM WATER OR LOCATIONS WHERE WATER MAY BE NEEDED FOR FIRE IN OTHER STORAGE OR IN THE BUILDING ITSELF. AVOID HIGH TEMPERATURES. STORE UNDER KEROSENE OR OTHER NEUTRAL OIL. NEVER STORE UNDER HALOGENATED HYDROCARBONS. A DETACHED FIRE-RESISTANT BUILDING IS RECOMMENDED FOR QUANTITY STORAGE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D003.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO

CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A
FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE
EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN
AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/07/84 REVISION DATE: 02/25/92

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MANGANESE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS13590

CAS#: 7439-96-5 FORMULA: MN

MANGANESE IS A REDDISH-GRAY OR SILVER METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE THIRST, A METALLIC TASTE IN THE MOUTH, COLDNESS, FEVER, HEADACHE, COUGHING, MUSCULAR PAIN, NAUSEA, VOMITING, SWEATING, AND DIARRHEA. DRINKING ALCOHOL MAY WORSEN THE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, HALLUCINATIONS, BLOOD CHANGES, AND NERVE, KIDNEY, AND LIVER DAMAGE MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT WITH WATER TO FORM DANGEROUS SUBSTANCES. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS13590
7439-96-5
MANGANESE

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OHS13590

MATERIAL SAFETY DATA SHEET

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FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7439-96-5
RTECS NUMBER: 009275000

SUBSTANCE: MANGANESE

TRADE NAMES/SYNONYMS:

COLLOIDAL MANGANESE; MANGANESE ELEMENT; CUTAVAL; MANGANESE METAL; MN;
OHS13590

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: MN

MOLECULAR WEIGHT: 54.9380

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=1 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: MANGANESE
CAS# 7439-96-5

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

MANGANESE AND COMPOUNDS (AS MN):

5 MG/M3 OSHA CEILING; 1 MG/M3 OSHA TWA (FUME); 3 MG/M3 OSHA STEL (FUME)
5 MG/M3 ACGIH TWA (DUST);
1 MG/M3 ACGIH TWA (FUME); 3 MG/M3 ACGIH STEL (FUME)
1 MG/M3 NIOSH RECOMMENDED TWA; 3 MG/M3 NIOSH RECOMMENDED STEL
5 MG/M3 DFG MAK TWA (TOTAL DUST);
50 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; INDUCTIVELY COUPLED PLASMA;
(NIOSH VOL. III # 7300, ELEMENTS).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: REDDISH-GRAY OR SILVER, BRITTLE METALLIC SOLID.

BOILING POINT: 3564 F (1962 C) MELTING POINT: 2266-2277 F (1241-1247 C)

SPECIFIC GRAVITY: 7.20 VAPOR PRESSURE: 1 MMHG @ 1292 C

SOLUBILITY IN WATER: DECOMPOSES

SOLVENT SOLUBILITY: SOLUBLE IN DILUTE MINERAL ACIDS, SODIUM AND POTASSIUM BICARBONATE.

MOHS HARDNESS: 5.0

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
MERCURY BROMIDES-UN 1634

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:

EXCEPTIONS: NONE

NON-BULK PACKAGING: 49 CFR 173.212

BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:

PASSENGER AIRCRAFT OR RAILCAR: 25 KG

CARGO AIRCRAFT ONLY: 100 KG

TOXICITY

MANGANESE:

IRRITATION DATA: 500 MG/24 HOURS SKIN-RABBIT MILD; 500 MG/24 HOURS EYE-RABBIT
MILD.

TOXICITY DATA; 2300 UG/M3 INHALATION-MAN TCLQ; 9 GM/KG ORAL-RAT LD50;

TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: NONE.

ACUTE TOXICITY DATA: SLIGHTLY TOXIC BY INGESTION.

TARGET EFFECTS: NEUROTOXIN. POISONING MAY ALSO AFFECT THE RESPIRATORY SYSTEM
AND THE LIVER AND KIDNEYS.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH A HISTORY OF ALCOHOLISM,
PSYCHIATRIC, NEUROLOGIC, OR PULMONARY DISEASES, LIVER DYSFUNCTION, OR
ANEMIA.

ADDITIONAL DATA: SYMPTOMS MAY DEPEND ON A COMBINATION OF CONTRIBUTING
FACTORS INCLUDING GENETIC PREDISPOSITION, AGE, NUTRITION, ANEMIA OR ALCOHOL.

HEALTH EFFECTS AND FIRST AID

INHALATION:

MANGANESE:

NEUROTOXIN. 10,000 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- DUST OR FUMES MAY BE IRRITATING TO THE MUCOUS MEMBRANES.

METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED METAL OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST, AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS.

CHRONIC EXPOSURE- IF SUFFICIENT QUANTITIES OF MANGANESE DUST OR FUMES ARE INHALED AND ABSORBED, SYSTEMIC POISONING KNOWN AS "MANGANISM", A PARKINSONIAN-LIKE SYNDROME MAY OCCUR. IT IS CHARACTERIZED INITIALLY BY ANOREXIA, ASTHENIA, HEADACHE, INSOMNIA OR SOMNOLENCE, IRRITABILITY, RESTLESSNESS, AND SPASM OR PAIN IN THE MUSCLES. MANGANESE PSYCHOSIS MAY FOLLOW WITH UNCONTROLLABLE BEHAVIOR, UNACCOUNTABLE LAUGHING OR CRYING, VISUAL HALLUCINATIONS, CONFUSION AND EUPHORIA. SEXUAL EXCITEMENT FOLLOWED BY IMPOTENCE MAY OCCUR. THESE SYMPTOMS MAY DISAPPEAR WITH THE ONSET OF TRUE NEUROLOGICAL MANIFESTATIONS OF SLOW, SLURRED AND IRREGULAR SPEECH, MONOTONOUS TONE, DOUBLE VISION, IMPAIRED HEARING, DIFFICULTY WITH FINE MOTOR MOVEMENTS, AND DISTURBANCES IN GAIT AND BALANCE WITH FREQUENT PROPULSION OR RETROPULSION. MASK-LIKE FACE, DECREASED MOVEMENT OF THE EYELIDS AND EYES AND TREMORS OF THE UPPER EXTREMITIES AND HEAD MAY ALSO OCCUR. OTHER SIGNS AND SYMPTOMS MAY INCLUDE URINARY BLADDER DISTURBANCES, EXCESSIVE SALIVATION AND SWEATING, HEMATOLOGICAL CHANGES, VASOMOTOR DISORDERS, DECREASED PULMONARY FUNCTION, KIDNEY AND POSSIBLY LIVER DAMAGE. REMOVAL FROM EXPOSURE SHORTLY AFTER ONSET OF SYMPTOMS USUALLY RESULTS IN IMPROVEMENT, ALTHOUGH THERE MAY BE RESIDUAL DISTURBANCES IN GAIT AND SPEECH. ONCE MANGANISM IS WELL ESTABLISHED IT BECOMES IRREVERSIBLE AND PROGRESSIVE, BUT NOT FATAL. AN INCREASED INCIDENCE OF BRONCHITIS AND PNEUMONITIS HAS BEEN REPORTED IN STUDIES OF WORKERS EXPOSED TO MANGANESE DUST AND FUME, AND ALTHOUGH THESE EFFECTS HAVE BEEN CONFIRMED BY ANIMAL EXPERIMENTS, THEY MAY REPRESENT AN AGGRAVATION OF A PRE-EXISTING CONDITION. ALLERGIC DISEASES OF THE RESPIRATORY TRACT HAVE ALSO BEEN REPORTED IN ONE STUDY.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

MANGANESE:

ACUTE EXPOSURE- 500 MG APPLIED TO THE SKIN OF RABBITS CAUSED MILD IRRITATION.

CHRONIC EXPOSURE- SENSITIZATION HAS BEEN REPORTED IN GUINEA PIGS.

FIRST AID- 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.

EYE CONTACT:

MANGANESE:

ACUTE EXPOSURE- DUST OR FUMES MAY BE IRRITATING TO THE EYES. 500 MG APPLIED TO THE EYES OF RABBITS CAUSED MILD IRRITATION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

MANGANESE:

ACUTE EXPOSURE- EXTREMELY LARGE DOSES MAY CAUSE GASTROINTESTINAL IRRITATION AND POSSIBLY SYSTEMIC TOXICITY.

CHRONIC EXPOSURE- MANGANESE POISONING HAS BEEN REPORTED IN PERSONS DRINKING MANGANESE-CONTAMINATED WELL WATER.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

MANGANESE POISONING:

CALCIUM EDETATE IS EFFECTIVE IN REMOVING MANGANESE, BUT HAS NO PERMANENT EFFECT ON SYMPTOMATIC PATIENTS IN THE LATE STAGES OF MANGANISM. THE ADMINISTRATION OF CALCIUM DISODIUM EDETATE IS RECOMMENDED. EDETATE IS AVAILABLE AS 5 ML AMPULES OF 20% SOLUTION. GIVE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR. INTRAVENOUS ADMINISTRATION IS CONTRAINDICATED IN THE PRESENCE OF ELEVATED CEREBROSPINAL FLUID PRESSURE. FOR INTRAMUSCULAR ADMINISTRATION, GIVE 20% SOLUTION (200 MG/ML), 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE (DREISBACH, HANDBOOK OF POISONING, 11TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

MANGANESE:

DECOMPOSES WATER OR STEAM TO PRODUCE FLAMMABLE HYDROGEN GAS.

INCOMPATIBILITIES:

MANGANESE:

ALUMINUM (DUST): FORMS EXPLOSIVE MIXTURES WITH AIR.
AMMONIUM NITRATE (FUSED): VIOLENT OR EXPLOSIVE REACTION.
BROMINE PENTAFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.
CARBON DIOXIDE: IGNITES.
CHLORINE: IGNITES.
FLUORINE: INCANDESCENT REACTION.
HYDROGEN PEROXIDE: VIOLENT DECOMPOSITION AND/OR IGNITION.
NITRIC ACID: INCANDESCENT REACTION AND FEEBLE EXPLOSION.
NITROGEN DIOXIDE: IGNITION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
PHOSPHORUS: INCANDESCENT REACTION WHEN HEATED.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF MANGANESE.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

***STORAGE**

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

MANGANESE AND COMPOUNDS (AS MN):

10 MG/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND QUARTER-MASK RESPIRATORS.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

25 MG/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER (IF NOT PRESENT AS A FUME).
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

50 MG/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

1000 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A HALF-MASK AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

2000 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT

TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 06/27/85 REVISION DATE: 02/25/92

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MERCURY MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS14020

CAS#: 7439-97-6 FORMULA: HG

MERCURY IS AN ODORLESS, SILVER LIQUID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE MOUTH, NOSE, THROAT, SKIN, AND EYES WITH REDNESS AND ALLERGIC REACTIONS. ADDITIONAL EFFECTS MAY INCLUDE COUGHING, DIFFICULTY BREATHING, NAUSEA, VOMITING, DIARRHEA, SWEATING, DROOLING, METALLIC TASTE IN THE MOUTH, FEVER, THIRST, COLDNESS, MUSCLE PAIN, LUNG CONGESTION, AND IRREGULAR HEARTBEAT.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, HALLUCINATIONS, BLUE LINES ON THE GUMS, TWITCHING, AND NERVE AND KIDNEY DAMAGE MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS14020

7439-97-6

MERCURY

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OHS14020

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7439-97-6
RTECS NUMBER: OV4550000

SUBSTANCE: MERCURY

TRADE NAMES/SYNONYMS:

COLLOIDAL MERCURY; METALLIC MERCURY; NCI-C60399; QUICKSILVER;
INORGANIC MERCURY; RCRA U151; NA 2809; HYDRARGYRUM; ELEMENTAL MERCURY;
M-141; M-139, M-140; UN 2809; HG; OHS14020

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: HG

MOLECULAR WEIGHT: 200.59

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: MERCURY
CAS# 7439-97-6

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

MERCURY, ALL FORMS EXCEPT ALKYL (AS HG):

0.05 MG/M3 OSHA TWA (VAPOR) (SKIN); 0.1 MG/M3 OSHA CEILING (SKIN)
0.05 MG/M3 ACGIH TWA (VAPOR); 0.10 MG/M3 ACGIH TWA (ARYL & INORGANIC) (SKIN)
0.05 MG/M3 NIOSH RECOMMENDED TWA (VAPOR) (SKIN);
0.1 MG/M3 NIOSH RECOMMENDED TWA (SKIN)
0.01 PPM (0.1 MG/M3) DFG MAK TWA;
0.1 PPM (1.0 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

MEASUREMENT METHOD: HYDRAR(R) SORBENT TUBE; ACID; ATOMIC ABSORPTION
SPECTROMETRY (COLD); (NIOSH VOL. III # 6009).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (JULY 1, 1970)

MERCURY:

1 POUND CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: ODORLESS, SILVERY LIQUID WITH A METALLIC LUSTER.

BOILING POINT: 674 F (357 C) MELTING POINT: -38 F (-39 C)

SPECIFIC GRAVITY: 13.5939 VAPOR PRESSURE: 0.002 MMHG @ 25 C

SOLUBILITY IN WATER: INSOLUBLE VAPOR DENSITY: 7.0

SOLVENT SOLUBILITY: SOLUBLE IN BOILING SULFURIC ACID, NITRIC ACID, LIPIDS;
INSOLUBLE IN ALCOHOL, ETHER, HYDROCHLORIC ACID, HYDROGEN BROMIDE,
HYDROGEN IODIDE.

VISCOSITY: 1.55 CPS @ 20 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS (1990 EMERGENCY RESPONSE GUIDEBOOK,
DOT P 5800.5, GUIDE PAGE 60).

USE AGENTS SUITABLE FOR TYPE OF FIRE; USE WATER IN FLOODING AMOUNTS AS A FOG.
AVOID BREATHING CORROSIVE AND POISONOUS VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
ORM-B

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.860
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
MERCURY-UN 2890

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
8 - CORROSIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
CORROSIVE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.164
NON-BULK PACKAGING: 49 CFR 173.164
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 35 KG
CARGO AIRCRAFT ONLY: 35 KG

TOXICITY

MERCURY:
TOXICITY DATA: 150 UG/M3/46 DAYS INHALATION-WOMAN TCLO; 44,300 UG/M3/8 HOURS
INHALATION-MAN TCLO; 29 MG/M3/30 HOURS INHALATION-RABBIT LCLO;
129 MG/KG/5 HOURS CONTINUOUS SKIN-MAN TDLO; MUTAGENIC DATA (RTECS);
REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- INHALATION.
ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.
TARGET EFFECTS: SENSITIZER- RESPIRATORY, DERMAL; NEUROTOXIN; NEPHROTOXIN;
POISONING MAY ALSO AFFECT THE RESPIRATORY AND GASTROINTESTINAL SYSTEMS.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH CHRONIC RESPIRATORY DISEASE,
NERVOUS SYSTEM DISORDERS AND KIDNEY DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

MERCURY:

IRRITANT/SENSITIZER/NEUROTOXIN/NEPHROTOXIN.

28 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF HIGH LEVELS OF MERCURY VAPOR MAY CAUSE ALMOST IMMEDIATE DYSPNEA, COUGH, FEVER, NAUSEA, VOMITING, DIARRHEA, HEADACHE, STOMATITIS, SALIVATION, GINGIVITIS, A METALLIC TASTE, AND CARDIAC ABNORMALITIES. RESPIRATORY IRRITATION MAY OCCUR WITH CHEST PAIN AND TIGHTNESS. SYMPTOMS MAY RESOLVE OR MAY PROGRESS TO NECROTIZING BRONCHIOLITIS, PNEUMONITIS, PULMONARY EDEMA, PNEUMOTHORAX, INTERSTITIAL FIBROSIS, AND DEATH. ACIDOSIS AND RENAL DAMAGE MAY ALSO OCCUR. ALLERGIC REACTIONS THAT MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS INCLUDE DERMATITIS, ENCEPHALITIS, AND DEATH. LOSS OF LIBIDO AND IMPOTENCE HAVE BEEN REPORTED IN MEN ACUTELY EXPOSED TO METALLIC MERCURY VAPOR. METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED METAL OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST, AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS.

CHRONIC EXPOSURE- INHALATION OF MERCURY VAPOR OVER A LONG PERIOD MAY CAUSE MERCURIALISM, WHICH IS CHARACTERIZED BY FINE TREMORS AND ERETHISM. TREMORS MAY AFFECT THE HANDS FIRST, BUT MAY ALSO BECOME EVIDENT IN THE FACE, ARMS, AND LEGS. ERETHISM MAY BE MANIFESTED BY ABNORMAL SHYNESS, BLUSHING, SELF-CONSCIOUSNESS, DEPRESSION OR DESPONDENCY, RESENTMENT OF CRITICISM, IRRITABILITY OR EXCITABILITY, HEADACHE, FATIGUE, AND INSOMNIA. IN SEVERE CASES, HALLUCINATIONS, LOSS OF MEMORY, AND MENTAL DETERIORATION MAY OCCUR. CONCENTRATIONS AS LOW AS 0.03 MG/M3 HAVE INDUCED PSYCHIATRIC SYMPTOMS IN HUMANS. RENAL INVOLVEMENT MAY BE INDICATED BY PROTEINURIA, ALBUMINURIA, ENZYMURIA, AND ANURIA. OTHER EFFECTS MAY INCLUDE SALIVATION, GINGIVITIS, STOMATITIS, LOOSENING OF THE TEETH, BLUE LINES ON THE GUMS, DIARRHEA, WEIGHT LOSS, ANOREXIA, SPEECH AND SENSORY DISORDERS, UNSTEADY GAIT, CHRONIC PNEUMONITIS AND MILD ANEMIA. REPEATED EXPOSURE TO MERCURY AND ITS COMPOUNDS MAY RESULT IN SENSITIZATION. WOMEN OCCUPATIONALLY EXPOSED HAVE REPORTED MENSTRUAL DISTURBANCES, REDUCED OVULATION AND AN INCREASED RISK OF SPONTANEOUS ABORTION. INTRAUTERINE EXPOSURE MAY RESULT IN TREMORS AND INVOLUNTARY MOVEMENTS IN THE INFANTS. MERCURY IS EXCRETED BREAST MILK. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

MERCURY:

SENSITIZER/NEUROTOXIN/NEPHROTOXIN.

ACUTE EXPOSURE- DIRECT CONTACT WITH LIQUID MAY CAUSE IRRITATION AND REDNESS. SMALL AMOUNTS OF MERCURY MAY BE ABSORBED THROUGH INTACT SKIN. ALLERGIC REACTIONS THAT MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS INCLUDE DERMATITIS, ENCEPHALITIS, AND DEATH. SUBCUTANEOUS INTRODUCTION, FROM HANDLING BROKEN THERMOMETERS, MAY RESULT IN LOCAL INFLAMMATION, GRANULOMATOUS SKIN REACTIONS, AND SLIGHT SIGNS OF MERCURY POISONING INCLUDING DIGESTIVE DISORDERS, METALLIC TASTE IN THE MOUTH, AND NEUROPSYCHIC DISORDERS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY RESULT IN DERMAL SENSITIZATION AND SYSTEMIC EFFECTS AS DETAILED IN CHRONIC INHALATION EXPOSURE.

FIRST AID- 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.

EYE CONTACT:

MERCURY:

ACUTE EXPOSURE- DIRECT CONTACT WITH LIQUID MAY CAUSE IRRITATION AND REDNESS. ANIMAL STUDIES INDICATE DIFFUSION AND ABSORPTION OF MERCURY INTO THE TISSUES OF THE EYE MAY OCCUR. NO CLINICAL SIGNS OF CONJUNCTIVITIS OR INFLAMMATION OCCURRED.

CHRONIC EXPOSURE- MERCURY EXPOSURE FROM INHALATION, INGESTION, OR SKIN CONTACT MAY BE INDICATED BY MERCURIALENTIS, DISCOLORATION OF THE CRYSTALLINE LENS, ON SLIT LAMP EXAMINATION OF THE EYE.

FIRST AID- WASH 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.

INGESTION:

MERCURY:

NEUROTOXIN/NEPHROTOXIN.

ACUTE EXPOSURE- MAY CAUSE BURNING OF THE MOUTH AND THROAT, THIRST, NAUSEA AND VOMITING. METALLIC MERCURY IS NOT USUALLY ABSORBED SUFFICIENTLY FROM THE GASTROINTESTINAL TRACT TO INDUCE AN ACUTE TOXIC RESPONSE. RARELY, A LARGE SINGLE DOSE MAY RESULT IN SIGNS AND SYMPTOMS OF CHRONIC INHALATION IF SUFFICIENT AMOUNTS OF MERCURY ARE RETAINED IN THE BODY.

CHRONIC EXPOSURE- REPEATED INGESTION OF SMALL AMOUNTS OF MERCURY MAY RESULT IN THE ABSORPTION OF SUFFICIENT AMOUNTS TO PRODUCE TOXIC EFFECTS AS DETAILED IN CHRONIC INHALATION EXPOSURE.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. MAINTAIN BLOOD PRESSURE AND AIRWAY. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO

WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

MERCURY POISONING:

GIVE DIMERCAPROL, 3 MG/KG (OR 0.3 ML/10 KG) EVERY 4 HOURS FOR THE FIRST 2 DAYS AND THEN 2 MG/KG EVERY 12 HOURS FOR A TOTAL OF 10 DAYS IF NECESSARY. DIMERCAPROL IS AVAILABLE AS A 10% SOLUTION IN OIL FOR INTRAMUSCULAR ADMINISTRATION. HEMODIALYSIS WILL SPEED THE REMOVAL OF THE MERCURY-DIMERCAPROL COMPLEX. PENICILLAMINE IS ALSO EFFECTIVE. GIVE UP TO 100 MG/KG/DAY (MAXIMUM 1 GR/DAY) DIVIDED INTO 4 DOSES FOR NO LONGER THAN 1 WEEK. IF A LONGER ADMINISTRATION PERIOD IS WARRANTED, DOSAGE SHOULD NOT EXCEED 40 MG/KG/DAY. GIVE THE DRUG ORALLY HALF AN HOUR BEFORE MEALS. A CHELATING AGENT SHOULD BE CONTINUED UNTIL THE URINE-MERCURY LEVEL FALLS BELOW 50 UG/24 HOURS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

MERCURY:

ACETYLENE: FORMATION OF EXPLOSIVE COMPOUND.
 ACETYLINIC COMPOUNDS: FORMATION OF EXPLOSIVE COMPOUND.
 ALUMINUM: CORRODES.
 AMINES: MAY FORM EXPLOSIVE COMPOUNDS.
 AMMONIA + MOISTURE: FORMS EXPLOSIVE COMPOUND.
 BORON DIIODPHOSPHIDE: IGNITES IN CONTACT WITH MERCURY VAPORS.
 BROMINE: VIOLENT REACTION.
 3-BROMOPROPYNE: EXPLOSION HAZARD.
 CALCIUM: AMALGAM FORMATION @ 390 C IS VIOLENT.
 CHLORINE: IGNITES @ 200-300 C.
 CHLORINE DIOXIDE: EXPLODES.
 COPPER (AND ALLOYS): MAY BE ATTACKED.
 ETHYLENE OXIDE + TRACES OF ACETYLENE: MAY FORM EXPLOSIVE ACETYLIDES.
 LITHIUM: AMALGAM FORMATION IS VIOLENTLY EXOTHERMIC AND MAY BE EXPLOSIVE.
 METHYL AZIDE: PRODUCES SHOCK SENSITIVE MIXTURE.
 METHYLSILANE + OXYGEN: PRODUCES SHOCK SENSITIVE MIXTURE.
 NITRIC ACID + ALCOHOLS: FORMS FULMINATES CAPABLE OF DETONATION.
 OXALIC ACID: FORMS SHOCK SENSITIVE COMPOUND.
 OXIDANTS: VIOLENT REACTION.
 PEROXYFORMIC ACID: EXPLOSIVE REACTION.
 POTASSIUM: AMALGAM FORMATION IS VIGOROUSLY EXOTHERMIC AND MAY BE EXPLOSIVE.
 RUBIDIUM: VIOLENT EXOTHERMIC REACTION.
 SILVER PERCHLORATE + 3-HEXYNE: EXPLODES.
 SILVER PERCHLORATE + 2-PENTYNE: EXPLODES.
 SODIUM: AMALGAM FORMATION IS VIOLENTLY EXOTHERMIC.
 SODIUM CARBIDE: VIGOROUS REACTION.
 SULFURIC ACID (HOT): REACTS.
 TETRACARBONYLNICKEL + OXYGEN: PRODUCES SHOCK SENSITIVE MIXTURE.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HIGHLY TOXIC VAPORS OF MERCURY AND MERCURY OXIDES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER U151.

MERCURY - REGULATORY LEVEL: 0.2 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D009.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. MAY IGNITE COMBUSTIBLES (WOOD, PAPER, OIL, ETC.).

SPILL AND LEAK PROCEDURES

WATER SPILL:

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. A MERCURY SPILL KIT MAY ALSO BE USED FOR SMALL SPILLS IN THE WORKPLACE. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 1 POUND

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

MERCURY, ELEMENTAL:

0.5 MG/M3- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH CARTRIDGE(S) PROVIDING PROTECTION AGAINST MERCURY.*
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

1.25 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW MODE.
ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A CANISTER PROVIDING PROTECTION AGAINST MERCURY.*

2.5 MG/M3- ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR THAT HAS A TIGHT-FITTING FACEPIECE AND IS OPERATED IN A CONTINUOUS-FLOW MODE.
ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND CARTRIDGE(S) PROVIDING PROTECTION AGAINST MERCURY.*
ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST MERCURY.*
ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A CANISTER PROVIDING PROTECTION AGAINST MERCURY.

28 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST MERCURY.
ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

* END OF SERVICE LIFE INDICATOR (ESLI) REQUIRED.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 01/31/85 REVISION DATE: 02/25/92

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METHYL ALCOHOL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS14280

CAS#: 67-56-1 FORMULA: CH4O

METHYL ALCOHOL IS A CLEAR LIQUID WITH AN ALCOHOL-LIKE ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 52 F (11 C). DANGEROUS FIRE HAZARD. VAPOR-AIR MIXTURES MAY BE EXPLOSIVE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

FOR SMALL FIRES: USE DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY, OR STANDARD FOAM.

FOR LARGE FIRES: USE WATER SPRAY, FOG OR ALCOHOL-RESISTANT FOAM.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE SKIN AND EYES. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, DRUNKENNESS, COUGHING, NAUSEA, VOMITING, BACK, STOMACH, ARM, AND LEG PAIN, SWEATING, DIFFICULTY BREATHING, LUNG CONGESTION, BLUISH COLOR OF THE SKIN, LIPS, AND FINGERNAILS, UNCONSCIOUSNESS, BLINDNESS, AND LIVER AND KIDNEY DAMAGE.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES AND NERVE DAMAGE MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SPILL OR LEAK:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

CERCLA REPORTABLE QUANTITY: 5000 POUND(S).

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE

MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS14280
67-56-1
METHYL ALCOHOL

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OHS14280

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 67-56-1
RTECS NUMBER: PC1400000

SUBSTANCE: METHYL ALCOHOL

TRADE NAMES/SYNONYMS:

METHANOL; WOOD ALCOHOL; METHYL HYDROXIDE; CARBINOL; MONOHYDROXYMETHANE;
WOOD SPIRIT; WOOD NAPHTHA; METHYLOL; COLONIAL SPIRIT; COLUMBIAN SPIRIT;
PYROXYLIC SPIRIT; BOOSTER FUEL (HENES PRODUCT CORP.);
METHANOL (ELECTROKLEIN) (ROK);
METHANOL, SPECTRO QUALITY (MCS MANF. CHEMIST);
COULOMATIC (R) CONDITIONER SOLUTION; STANDARD WATER IN METHANOL;
STCC 4904230; RCRA U154; UN 1230; CH40; OHS14280

CHEMICAL FAMILY:
HYDROXYL, ALIPHATIC

MOLECULAR FORMULA: C-H3-O-H

MOLECULAR WEIGHT: 32.04

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: METHYL ALCOHOL (METHANOL)
CAS# 67-56-1

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

METHYL ALCOHOL (METHANOL):

200 PPM (262 MG/M3) OSHA TWA (SKIN); 250 PPM (328 MG/M3) OSHA STEL
200 PPM (262 MG/M3) ACGIH TWA (SKIN); 250 PPM (328 MG/M3) ACGIH STEL
200 PPM (262 MG/M3) NIOSH RECOMMENDED TWA (SKIN);
250 PPM (328 MG/M3) NIOSH RECOMMENDED STEL
200 PPM (262 MG/M3) DFG MAK TWA (SKIN);
400 PPM (524 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; WATER; GAS CHROMATOGRAPHY WITH FLAME
IONIZATION DETECTION; (NIOSH VOL. III # 2000, METHANOL).

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A CHARACTERISTIC ALCOHOLIC ODOR.

BOILING POINT: 149 F (65 C) MELTING POINT: -137 F (-94 C)

SPECIFIC GRAVITY: 0.7914 VISCOSITY: 0.59 CPS @ 20 C

VAPOR PRESSURE: 97.25 MMHG @ 20 C EVAPORATION RATE: (BUTYL ACETATE=1) 4.6

SOLUBILITY IN WATER: VERY SOLUBLE ODOR THRESHOLD: 100 PPM

VAPOR DENSITY: 1.11

SOLVENT SOLUBILITY: SOLUBLE IN ETHER, BENZENE, ALCOHOL, ACETONE,
CHLOROFORM, ETHANOL, KETONES AND MOST OTHER ORGANIC SOLVENTS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT, FLAME, OR OXIDIZERS.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: 52 F (11 C) (CC) UPPER EXPLOSIVE LIMIT: 36.0%

LOWER EXPLOSIVE LIMIT: 6.0% AUTOIGNITION TEMP.: 725 F (385 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL-RESISTANT FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL-RESISTANT FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
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. ISOLATE
FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN
FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 28).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG, SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.119
EXCEPTIONS: 49 CFR 173.118

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
METHYL ALCOHOL-UN 1230

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID, POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 1 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

METHYL ALCOHOL (METHANOL):

IRRITATION DATA: 20 MG/24 HOURS SKIN-RABBIT MODERATE; 40 MG EYE-RABBIT MODERATE; 100 MG/24 HOURS EYE-RABBIT MODERATE.
 TOXICITY DATA: 86,000 MG/M3 INHALATION-HUMAN TCLO; 300 PPM INHALATION-HUMAN TCLO; 64,000 PPM/4 HOURS INHALATION-RAT LC50; 1000 PPM INHALATION-MONKEY LCLO; 50 GM/M3/2 HOURS INHALATION-MOUSE LCLO; 44,000 MG/M3/3 HOURS INHALATION-CAT LCLO; 15,800 MG/KG SKIN-RABBIT LD50; 393 MG/KG SKIN-MONKEY LDLO; 428 MG/KG ORAL-HUMAN LDLO; 143 MG/KG ORAL-HUMAN LDLO; 6422 MG/KG ORAL-MAN LDLO; 3429 MG/KG ORAL-MAN TDLO; 4 GM/KG ORAL-WOMAN TDLO; 7 GM/KG ORAL-MONKEY LD50; 5628 MG/KG ORAL-RAT LD50; 7300 MG/KG ORAL-MOUSE LD50; 14,200 MG/KG ORAL-RABBIT LD50; 7500 MG/KG ORAL-DOG LDLO; 9800 MG/KG SUBCUTANEOUS-MOUSE LD50; 2131 MG/KG INTRAVENOUS-RAT LD50; 4710 MG/KG INTRAVENOUS-MOUSE LD50; 8907 MG/KG INTRAVENOUS-RABBIT LD50; 4641 MG/KG INTRAVENOUS-CAT LDLO; 7529 MG/KG INTRAPERITONEAL-RAT LD50; 10,765 MG/KG INTRAPERITONEAL-MOUSE LD50; 1826 MG/KG INTRAPERITONEAL-RABBIT LD50; 3556 MG/KG INTRAPERITONEAL-GUINEA PIG LD50; 8555 MG/KG INTRAPERITONEAL-HAMSTER LD50; 868 MG/KG UNREPORTED-MAN LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
 CARCINOGEN STATUS: NONE.
 LOCAL EFFECTS: IRRITANT- SKIN, EYE.
 ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INHALATION, DERMAL ABSORPTION, INGESTION.
 TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; NEUROTOXIN.
 AT INCREASED RISK FROM EXPOSURE: PERSONS WITH KIDNEY, EYE OR SKIN DISORDERS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

METHYL ALCOHOL (METHANOL):

NARCOTIC/NEUROTOXIN. 25,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- MAY CAUSE IRRITATION OF THE MUCOUS MEMBRANES, COUGHING, OPPRESSION IN THE CHEST, TRACHEITIS, BRONCHITIS, TINNITUS, UNSTEADY GAIT, TWITCHING, COLIC, CONSTIPATION, NYSTAGMUS, AND BLEPHAROSPASM. SYMPTOMS FROM OCCUPATIONAL EXPOSURE INCLUDE PARESTHESIAS, NUMBNESS AND SHOOTING PAINS IN THE HANDS AND FOREARMS. METABOLIC ACIDOSIS, AND EFFECTS ON THE EYES AND CENTRAL NERVOUS SYSTEM MAY OCCUR AS DETAILED IN ACUTE INGESTION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE EFFECTS AS IN ACUTE INGESTION. REPEATED EXPOSURE TO 200-375 PPM CAUSED RECURRENT HEADACHES IN WORKERS. EXPOSURE FOR 4 YEARS TO 1200-8000 PPM RESULTED IN MARKED DIMINUTION OF VISION AND ENLARGEMENT OF THE LIVER IN A WORKMAN. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

METHYL ALCOHOL (METHANOL):

IRRITANT/NARCOTIC/NEUROTOXIN.

ACUTE EXPOSURE- CONTACT WITH LIQUID MAY CAUSE IRRITATION. SKIN ABSORPTION MAY OCCUR AND CAUSE METABOLIC ACIDOSIS AND EFFECTS ON THE EYES AND CENTRAL NERVOUS SYSTEM AS DETAILED IN ACUTE INGESTION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH THE LIQUID MAY CAUSE DEFATTING OF THE SKIN RESULTING IN ERYTHEMA, SCALING, AND ECZEMATOID DERMATITIS. CHRONIC ABSORPTION MAY RESULT IN METABOLIC ACIDOSIS AND EFFECTS AS DETAILED IN ACUTE INGESTION.

FIRST AID- 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.

EYE CONTACT:

METHYL ALCOHOL (METHANOL):
IRRITANT.

ACUTE EXPOSURE- VAPORS MAY CAUSE IRRITATION. HIGH CONCENTRATIONS HAVE BEEN REPORTED TO CAUSE VIOLENT INFLAMMATION OF THE CONJUNCTIVA AND EPITHELIAL DEFECTS ON THE CORNEA. MILD IRRITATION MAY OCCUR WITH DILUTE SOLUTIONS; THE UNDILUTED LIQUID HAS PRODUCED MODERATE CORNEAL OPACITY AND CONJUNCTIVAL REDNESS IN RABBITS. APPLICATION OF A DROP OF METHANOL IN RABBIT EYES CAUSED A MILD REVERSIBLE REACTION, GRADED 3 ON A SCALE OF 1-10 AFTER 24 HOURS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

METHYL ALCOHOL (METHANOL):
NARCOTIC/NEUROTOXIN.

ACUTE EXPOSURE- MAY CAUSE MILD AND TRANSIENT INEBRIATION AND SUBSEQUENT DROWSINESS FOLLOWED BY AN ASYMPTOMATIC PERIOD LASTING 8-48 HOURS. FOLLOWING THE DELAY, COUGHING, DYSPNEA, HEADACHE, DULLNESS, WEAKNESS, VERTIGO OR DIZZINESS, NAUSEA, VOMITING, OCCASIONAL DIARRHEA, ANOREXIA, VIOLENT PAIN IN THE BACK, ABDOMEN, AND EXTREMITIES, RESTLESSNESS, APATHY OR DELIRIUM, AND RARELY, EXCITEMENT AND MANIA MAY OCCUR. RAPID, SHALLOW RESPIRATION DUE TO METABOLIC ACIDOSIS, COLD AND CLAMMY SKIN, HYPOTENSION, CYANOSIS, OPISTHOTONOS, CONVULSIONS, MILD TACHYCARDIA, CARDIAC DEPRESSION, PERIPHERAL NEURITIS, CEREBRAL AND PULMONARY EDEMA, UNCONSCIOUSNESS, AND COMA ARE POSSIBLE. EFFECTS ON THE EYE MAY INCLUDE OPTIC NEURITIS, BLURRED OR DIMMED VISION, DILATED, UNRESPONSIVE PUPILS, PTOSIS, EYE PAIN, CONCENTRIC CONSTRICTION OF VISUAL FIELDS, DIPLOPIA, CHANGE IN COLOR PERCEPTION, PHOTOPHOBIA, AND OPTIC NERVE ATROPHY. PARTIAL BLINDNESS OR POSSIBLY DELAYED TRANSIENT OR PERMANENT BLINDNESS MAY OCCUR. BILATERAL SENSORINEURAL DEAFNESS HAS BEEN REPORTED IN A SINGLE CASE. LIVER, KIDNEY, HEART, STOMACH, INTESTINAL AND PANCREATIC DAMAGE MAY ALSO OCCUR. DEATH MAY BE DUE TO RESPIRATORY FAILURE OR RARELY FROM CIRCULATORY COLLAPSE. AS LITTLE AS 15 ML HAS CAUSED BLINDNESS; THE USUAL FATAL DOSE IS 60-240 ML. PROLONGED ASTHENIA AND IRREVERSIBLE EFFECTS ON THE NERVOUS SYSTEM INCLUDING DIFFICULTY IN SPEECH, MOTOR DYSFUNCTION WITH RIGIDITY, SPASTICITY, AND HYPOKINESIS HAVE BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED INGESTION MAY CAUSE VISUAL IMPAIRMENT AND BLINDNESS AND OTHER SYSTEMIC EFFECTS AS DETAILED IN ACUTE INGESTION. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- IF INGESTION OF METHANOL IS DISCOVERED WITHIN 2 HOURS, GIVE SYRUP OF IPECAC. LAVAGE THOROUGHLY WITH 2-4 L OF TAP WATER WITH SODIUM BICARBONATE (20 G/L) ADDED. GET MEDICAL ATTENTION IMMEDIATELY. LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL (DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

ANTIDOTE:

THE FOLLOWING ANTIDOTE(S) HAVE BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

METHANOL POISONING:

GIVE ETHANOL, 50% (100 PROOF), 1.5 ML/KG ORALLY INITIALLY, DILUTED TO NOT MORE THAN 5% SOLUTION, FOLLOWED BY 0.5-1.0 ML/KG EVERY 2 HOURS ORALLY OR INTRAVENOUSLY FOR 4 DAYS IN ORDER TO REDUCE METABOLISM OF METHANOL AND TO ALLOW TIME FOR ITS EXCRETION. BLOOD ETHANOL LEVEL SHOULD BE IN THE RANGE OF 1-1.5 MG/ML (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ORAL OR INTRAVENOUS ADMINISTRATION OF 4-METHYLPYRAZOLE INHIBITS ALCOHOL DEHYDROGENASE AND HAS BEEN USED EFFECTIVELY AS AN ANTIDOTE FOR METHANOL OR ETHYLENE GLYCOL POISONING (ELLENHORN AND BARCELOUX, MEDICAL TOXICOLOGY).

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

METHYL ALCOHOL (METHANOL):

ACETYL BROMIDE: VIOLENT REACTION WITH FORMATION OF HYDROGEN BROMIDE.

ALKYLALUMINUM SOLUTIONS: VIOLENT REACTION.

ALUMINUM: CORRODES.

BARIUM PERCHLORATE: DISTILLATION YIELDS HIGHLY EXPLOSIVE ALKYL PERCHLORATE.

BERYLLIUM HYDRIDE: VIOLENT REACTION, EVEN AT -196 C.

BROMINE: VIGOROUSLY EXOTHERMIC REACTION.

CALCIUM CARBIDE: VIOLENT REACTION.

CHLORINE: POSSIBLE IGNITION AND EXPLOSION HAZARD.

CHLOROFORM AND SODIUM HYDROXIDE: EXPLOSIVE REACTION.

CHROMIUM TRIOXIDE (CHROMIC ANHYDRIDE): POSSIBLE IGNITION.

CYANURIC CHLORIDE: VIOLENT REACTION.

DICHLOROMETHANE: POSSIBLE IGNITION AND EXPLOSION.

DIETHYL ZINC: POSSIBLE IGNITION AND EXPLOSION.

HYDROGEN PEROXIDE + WATER: EXPLOSION HAZARD.

IODINE + ETHANOL + MERCURIC OXIDE: EXPLOSION HAZARD.

LEAD: CORRODES.

LEAD PERCHLORATE: EXPLOSION HAZARD.

MAGNESIUM: VIOLENT REACTION.

MAGNESIUM (POWDERED): MIXTURES ARE CAPABLE OF DETONATION.

METALS: INCOMPATIBLE.

NICKEL: POSSIBLE IGNITION IN THE PRESENCE OF NICKEL CATALYST.

NITRIC ACID (CONCENTRATED): MIXTURES OF GREATER THAN 25% ACID MAY DECOMPOSE

VIOLENTLY.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
PERCHLORIC ACID: EXPLOSION HAZARD.
PHOSPHOROUS TRIOXIDE: POSSIBLE VIOLENT REACTION AND IGNITION.
PLASTICS, RUBBER, COATINGS: MAY BE ATTACKED.
POTASSIUM: POSSIBLE DANGEROUS REACTION.
POTASSIUM HYDROXIDE + CHLOROFORM: EXOTHERMIC REACTION.
POTASSIUM TERT-BUTOXIDE: FIRE AND EXPLOSION HAZARD.
SODIUM + CHLOROFORM: POSSIBLE EXPLOSION.
SODIUM HYPOCHLORITE: EXPLOSION HAZARD.
SODIUM METHOXIDE + CHLOROFORM: VIOLENT REACTION.
SULFURIC ACID: FIRE AND EXPLOSION HAZARD.
ZINC: EXPLOSION HAZARD.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER U154.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES OR OTHER IGNITION SOURCES. VAPORS MAY BE EXPLOSIVE. MATERIAL IS POISONOUS; AVOID INHALATION OF VAPORS OR CONTACT WITH SKIN. DO NOT ALLOW MATERIAL TO CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN VAPORS.

WATER SPILL:

ALLOW SPILLED MATERIAL TO AERATE.

LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

METHYL ALCOHOL (METHANOL):

2000 PPM- ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

5000 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW MODE.

10,000 PPM- ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR THAT HAS A TIGHT-FITTING FACEPIECE AND
IS OPERATED IN A CONTINUOUS-FLOW MODE.

25,000 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED
IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT
EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY
BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH
FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 09/25/84 REVISION DATE: 04/15/92

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METHYL ETHYL KETONE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS14460

CAS#: 78-93-3

FORMULA: C₄H₈O

METHYL ETHYL KETONE IS A COLORLESS LIQUID WITH A STRONG ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 16 F (-9 C). DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE EYES, NOSE, AND THROAT, AND SWELLING AND REDNESS OF THE SKIN. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, HEADACHE, DIFFICULTY BREATHING, ABDOMINAL PAIN, NAUSEA, VOMITING, LUNG CONGESTION, COUGHING UP BLOOD, AND LIVER DAMAGE. DRINKING ALCOHOL MAY WORSEN THE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES AND NUMBNESS IN ARMS AND LEGS MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS14460

78-93-3

METHYL ETHYL KETONE

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OHS14460

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 78-93-3
RTECS NUMBER: EL6475000

SUBSTANCE: METHYL ETHYL KETONE

TRADE NAMES/SYNONYMS:

BUTANONE; 2-BUTANONE; ETHYL METHYL KETONE; METHYL ACETONE; 3-BUTANONE; MEK;
SCOTCH-GRIP (R) BRAND SOLVENT #3 (3M);
STOP, SHIELD, PEEL REDUCER (PYRAMID PLASTICS, INC.);
STABOND C-THINNER (STABOND CORP.); OATEY CLEANER (OATEY COMPANY); RCRA U159;
STCC 4909243; UN 1193; C4H8O; OHS14460

CHEMICAL FAMILY:
KETONE, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-H2-C-O-C-H3

MOLECULAR WEIGHT: 72.12

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: METHYL ETHYL KETONE
CAS# 78-93-3

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

METHYL ETHYL KETONE:

200 PPM (590 MG/M3) OSHA TWA; 300 PPM (885 MG/M3) OSHA STEL
200 PPM (590 MG/M3) ACGIH TWA; 300 PPM (885 MG/M3) ACGIH STEL
200 PPM (590 MG/M3) NIOSH RECOMMENDED TWA;
300 PPM (885 MG/M3) NIOSH RECOMMENDED STEL
200 PPM (590 MG/M3) DFG MAK TWA;
400 PPM (1180 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT

MEASUREMENT METHOD: AMBERSORB (R) XE-347 TUBE; CARBON DISULFIDE; GAS
CHROMATOGRAPHY WITH FLAME IONIZATION DETECTION; (NIOSH VOL. III # 2500).

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS LIQUID WITH AN ACETONE-LIKE ODOR.

BOILING POINT: 176 F (80 C) MELTING POINT: -123 F (-86 C)

SPECIFIC GRAVITY: 0.8054 VAPOR PRESSURE: 100 MMHG @ 25 C

EVAPORATION RATE: (ETHER=1) 2.7 SOLUBILITY IN WATER: 27.5%

ODOR THRESHOLD: 0.25-10 PPM VAPOR DENSITY: 2.5

SOLVENT SOLUBILITY: ALCOHOL, ETHER, BENZENE, ACETONE, OILS, AND MOST COMMON INDUSTRIAL SOLVENTS.

VISCOSITY: 0.40 CPS @ 25 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: 16 F (-9 C) (CC) UPPER EXPLOSIVE LIMIT: 11.4% @ 200 F

LOWER EXPLOSIVE LIMIT: 1.4% @ 200 F AUTOIGNITION TEMP.: 759 F (404 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL-RESISTANT FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL-RESISTANT FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

ALCOHOL FOAM
(NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM

VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG, SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER. APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS, KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991)

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.119
EXCEPTIONS: 49 CFR 173.118

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
METHYL ETHYL KETONE-UN 1193

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L

CARGO AIRCRAFT ONLY: 60 L

TOXICITY

METHYL ETHYL KETONE:

IRRITATION DATA: 500 MG/24 HOURS SKIN-RABBIT MODERATE; 402 MG/24 HOURS SKIN-RABBIT MILD; 13,780 UG/24 HOURS OPEN SKIN-RABBIT MILD; 350 PPM EYE-HUMAN; 80 MG EYE-RABBIT.

TOXICITY DATA: 100 PPM/5 MINUTES INHALATION-HUMAN TCLO; 23,500 MG/M3/8 HOURS INHALATION-RAT LC50; 40 GM/M3/2 HOURS INHALATION-MOUSE LC50; 38 GM/M3 INHALATION-MAMMAL LC50; 6480 MG/KG SKIN-RABBIT LD50; 2737 MG/KG ORAL-RAT LD50; 4050 MG/KG ORAL-MOUSE LD50; 607 MG/KG INTRAPERITONEAL-RAT LD50; 616 MG/KG INTRAPERITONEAL-MOUSE LD50; 2000 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN AND EYES.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION AND INGESTION; SLIGHTLY TOXIC BY DERMAL ABSORPTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH A HISTORY OF CHRONIC SKIN OR RESPIRATORY DISEASE, OR PERIPHERAL NEUROPATHY.

ADDITIONAL DATA: MAY ENHANCE THE NEUROTOXIC EFFECTS OF N-HEXANE OR METHYL N-BUTYL KETONE, AND PREDISPOSE THE LIVER TO INJURY FROM HEPATOTOXINS INCLUDING CARBON TETRACHLORIDE AND CHLOROFORM, AND POTENTIATE THE NEPHROTOXICITY OF CHLOROFORM. INTERACTIONS WITH ALCOHOL MAY OCCUR. ONE STUDY SHOWS AN INCREASED RISK OF LEUKEMIA FOR CHILDREN WHOSE FATHERS HAD OCCUPATIONAL EXPOSURE TO METHYL ETHYL KETONE AFTER THE BIRTH OF THE CHILD.

HEALTH EFFECTS AND FIRST AID

INHALATION:

METHYL ETHYL KETONE:

IRRITANT/NARCOTIC. 3000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS OF 100-200 PPM CAUSED MILD NOSE AND THROAT IRRITATION; 90-270 PPM/4 HOURS CAUSED SHORTENED TIME ESTIMATIONS IN MEN AND INCREASED THE VARIATION IN TIME ESTIMATION TESTS IN WOMEN; 300-500 PPM WAS OBJECTIONABLE AND CAUSED THROAT IRRITATION, HEADACHE, VOMITING, AND NAUSEA; 3,300 PPM WAS MODERATELY IRRITATING; AND MOMENTARY EXPOSURE TO 10,000 PPM PRODUCED INTOLERABLE IRRITATION OF THE NOSE. OTHER EFFECTS MAY INCLUDE DIFFICULTY IN BREATHING, COUGHING AND SHORTNESS OF BREATH, AND CENTRAL NERVOUS SYSTEM DEPRESSION WITH DIZZINESS, DROWSINESS, WEAKNESS, LOSS OF CONSCIOUSNESS, AND POSSIBLY DEATH. ONE CASE OF RETROBULBAR NEURITIS HAS BEEN REPORTED IN A WORKER EXPOSED FOR 1 1/2 HOURS. HEADACHE, MILD VERTIGO AND DIMINISHED VISION WERE NOTED. TWO OTHER MEN HAD A SIMILAR EXPOSURE, BUT REPORTED ONLY MILD RESPIRATORY SYMPTOMS AND CONJUNCTIVAL IRRITATION. IT WAS SUGGESTED THE OPTIC NERVE TOXICITY MAY HAVE BEEN RELATED TO THE METABOLISM TO METHANOL. GUINEA PIGS EXPOSED TO 10,000 PPM DEVELOPED IRRITATION RAPIDLY, AND NARCOSIS DEVELOPED AFTER 240-280 MINUTES; AT 33,000 PPM THESE SYMPTOMS DEVELOPED SOONER AND CAUSED DEATH IN 200-260 MINUTES; AT 100,000 PPM NARCOSIS AND DEATH OCCURRED WITHIN 45-55 MINUTES. THE ANIMALS THAT DIED EXHIBITED EMPHYSEMA, SLIGHT CONGESTION OF THE BRAIN AND MARKED CONGESTION OF SYSTEMIC ORGANS,

ESPECIALLY THE LUNGS.

CHRONIC EXPOSURE- OFFSPRING OF PREGNANT RATS EXPOSED TO 1,000 OR 3,000 PPM EXHIBITED SKELETAL, SOFT TISSUE, AND STERNEBRAL VARIATIONS. THE SAME INVESTIGATORS REPEATED THE STUDY AND THE 3,000 PPM DOSE PRODUCED SLIGHT MATERNAL AND FETAL TOXICITY. HOWEVER, NO EMBRYO TOXICITY OR TERATOGENICITY WERE SEEN. OCCUPATIONAL EXPOSURE TO METHYL ETHYL KETONE AND ACETONE HAS PRODUCED UNCONSCIOUSNESS AND CONVULSIONS; METHYL ETHYL KETONE AND A JELLY-LIKE SUBSTANCE PRODUCED WEAKNESS AND NUMBNESS IN THE LEGS; AND METHYL ETHYL KETONE AND TETRAHYDROFURAN PRODUCED LOSS OF MUSCLE STRENGTH, FATIGUE, AND BILATERAL PARESTHESIA. METHYL ETHYL KETONE MAY HAVE POTENTIATED THE NEUROTOXIC EFFECTS OF N-HEXANE IN GLUE-SNIFFERS AND METHYL N-BUTYL KETONE IN WORKERS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

METHYL ETHYL KETONE:

IRRITANT.

ACUTE EXPOSURE- CONTACT WITH LIQUID OR CONCENTRATED VAPORS MAY CAUSE DERMATITIS. DIRECT CONTACT WITH THE LIQUID MAY CAUSE EXTREME THICKENING OF THE FINGERNAILS, WITH PERMANENT DESTRUCTION OF THE NAIL BEDS.

SKIN SENSITIZATION DID NOT OCCUR WHEN TESTED IN MAN. APPLICATION OF A LETHAL DOSE TO RABBIT SKIN PRODUCED ERYTHEMA, EDEMA, AND NECROSIS. LIVER AND INTESTINAL CONGESTION WERE ALSO REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DEFATTING OF THE SKIN PRODUCING A DRY, SCALY, FISSURED DERMATITIS. SKIN ABSORPTION MAY HAVE CONTRIBUTED TO THE TOXIC EFFECTS DETAILED IN CHRONIC INHALATION OF WORKERS EXPOSED TO METHYL ETHYL KETONE AND OTHER SUBSTANCES.

FIRST AID- 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.

EYE CONTACT:

METHYL ETHYL KETONE:

IRRITANT.

ACUTE EXPOSURE- EXPOSURE TO VAPOR CONCENTRATIONS OF 200 PPM CAUSED IRRITATION; 3,300 PPM PRODUCED MODERATE IRRITATION; AND 10,000 PPM WAS ALMOST INTOLERABLE TO GUINEA PIGS. ONE CASE OF SEVERE ANTERIOR UVEITIS HAS BEEN REPORTED FROM THE LIQUID, BUT MAY HAVE BEEN TRIGGERED BY TRAUMA. DIRECT CONTACT OF THE LIQUID CAUSED PAINFUL IRRITATION AND TEMPORARY CORNEAL INJURY IN RABBITS, GRADED 5 ON A SCALE OF 1-10. IN GUINEA PIGS, 100,000 PPM CAUSED TEMPORARY CORNEAL OPACITY WHICH CLEARED WITHIN 8 DAYS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

METHYL ETHYL KETONE:

NARCOTIC.

ACUTE EXPOSURE- INGESTION HAS CAUSED COMA, HYPERVENTILATION, METABOLIC ACIDOSIS AND TACHYCARDIA. OTHER EFFECTS MAY INCLUDE GASTROINTESTINAL IRRITATION WITH ABDOMINAL SPASMS, NAUSEA, VOMITING, HEADACHE, AND DIZZINESS. ADMINISTRATION OF LETHAL DOSES TO ANIMALS PRODUCED CONGESTED AND HEMORRHAGIC LUNGS AND CONGESTION OF THE LIVER, ALIMENTARY TRACT, AND PERITONEAL WALL. ASPIRATION OF KETONES MAY RESULT IN CHEMICAL PNEUMONITIS.

CHRONIC EXPOSURE- REPEATED ADMINISTRATION OF METHYL ETHYL KETONE AND ETHYL N-BUTYL KETONE PRODUCED CLINICAL NEUROPATHY IN ANIMALS.

FIRST AID- IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC FOLLOWED BY WATER. (IF VOMITING OCCURS KEEP THE HEAD BELOW THE HIPS TO PREVENT ASPIRATION). REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. GIVE ACTIVATED CHARCOAL. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

METHYL ETHYL KETONE:

CHLOROFORM: VIGOROUS, EXOTHERMIC REACTION IN THE PRESENCE OF A BASE.

CHLOROSULFONIC ACID: MIXING IN CLOSED CONTAINER MAY RESULT IN INCREASED TEMPERATURE AND PRESSURE.

EXPLOSIVES: MAY REACT.

HYDROGEN PEROXIDE, NITRIC ACID: PRODUCES SHOCK AND HEAT SENSITIVE OILY PEROXIDE.

ISOPROPANOL: ACCELERATES PEROXIDATION OF THE ALCOHOL PRODUCING AN EXPLOSIVE PRODUCT.

OLEUM: MIXING IN CLOSED CONTAINER MAY RESULT IN INCREASED TEMPERATURE AND PRESSURE.

OXIDIZERS (STRONG): POSSIBLE FIRE AND EXPLOSION HAZARD.

PEROXIDES: MAY REACT.

PLASTICS: MAY BE ATTACKED.

POTASSIUM TERT-BUTOXIDE: IGNITION REACTION.

RADIOACTIVE MATERIALS: MAY REACT.

RESINS: MAY BE ATTACKED.

RUBBER: MAY BE ATTACKED.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE OXIDES OF CARBON, METHANE, FORMALDEHYDE, METHANOL, AND PERACETIC ACID.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U159.

METHYL ETHYL KETONE - REGULATORY LEVEL: 200.0 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D035.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE AND POISONOUS; DO NOT ALLOW UNNECESSARY PERSONNEL IN AREA. DO NOT OVERHEAT CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE AND TRAVEL A CONSIDERABLE DISTANCE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

ABSORB BULK LIQUID WITH FLY ASH, CEMENT POWDER, SAWDUST, OR COMMERCIAL SORBENTS.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN VAPORS.

WATER SPILL:

LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

METHYL ETHYL KETONE:

1000 PPM- ANY POWERED, AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S).

3000 PPM- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

ESCAPE- 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.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 09/28/84 REVISION DATE: 02/25/92

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DICHLOROMETHANE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS14930

CAS#: 75-09-2 FORMULA: CH₂CL₂

DICHLOROMETHANE IS A CLEAR LIQUID WITH A MILD SWEET ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS. ACGIH SUSPECTED CANCER-CAUSING AGENT.

FIRE AND EXPLOSION HAZARDS:

SLIGHT FIRE HAZARD. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

FOR SMALL FIRES: USE DRY CHEMICAL OR CARBON DIOXIDE.

FOR LARGE FIRES: USE WATER SPRAY, FOG OR REGULAR FOAM.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION TO THE NOSE, THROAT, AND EYES, AND SEVERE IRRITATION TO THE SKIN. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, NAUSEA, DRUNKENNESS, BLOOD IN THE URINE, LUNG CONGESTION, IRREGULAR HEART BEATS, BLUE LIPS AND FINGERNAILS, SEIZURES, UNCONSCIOUSNESS, AND SUFFOCATION. DRINKING ALCOHOL MAY WORSEN THE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, HALLUCINATIONS, CHEST PAIN, AND NERVE, LIVER AND KIDNEY EFFECTS MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS AND CANCER.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SPILL OR LEAK:

CERCLA REPORTABLE QUANTITY: 1000 POUND(S).

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS14930

75-09-2

DICHLOROMETHANE

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MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: DICHLOROMETHANE

CAS NUMBER: 75-09-2
RTECS NUMBER: PA8050000

TRADE NAMES/SYNONYMS:

METHANE, DICHLORO-; METHYLENE CHLORIDE; METHYLENE DICHLORIDE; AEROTHENE MM;
NARKOTIL; SOLAESTHIN; SOLMETHINE; TC 523 EPOXY DISSOLVER (TECHFORM);
LACCO METHYLENE CHLORIDE (PPG INDUSTRIES INC.);
AEROTHENE (R) MM SOLVENT (DOW CHEMICAL);
EQUIPMENT FLUSHING SOLVENT (LOCTITE CORPORATION); LS-303 (POLYTECH);
20-8135 STRIP SOLVE (BUEHLER LTD.); RCRA U080; STCC 4941132; UN 1593;
CH₂CL₂; OHS14930

CHEMICAL FAMILY:
HALOGEN COMPOUND, ALIPHATIC

MOLECULAR FORMULA: C-H₂-CL₂

MOLECULAR WEIGHT: 84.93

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=1 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=1 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: DICHLOROMETHANE
CAS# 75-09-2

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

DICHLOROMETHANE (METHYLENE CHLORIDE):

500 PPM OSHA TWA; 1000 PPM OSHA CEILING; 2000 PPM/5 MIN IN 2 HOURS OSHA PEAK
50 PPM (174 MG/M³) ACGIH TWA
ACGIH A2- SUSPECTED HUMAN CARCINOGEN.
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA
100 PPM (360 MG/M³) DFG MAK TWA;
500 PPM (1800 MG/M³) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 2 TIMES/SHIFT

MEASUREMENT METHOD: CHARCOAL TUBE (2); CARBON DISULFIDE; GAS CHROMATOGRAPHY
WITH FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1005).

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (APRIL 1, 1988)

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A MILD, CHLOROFORM-LIKE ODOR.

BOILING POINT: 104 F (40 C) MELTING POINT: -139 F (-95 C)

SPECIFIC GRAVITY: 1.3266 VOLATILITY: 100%

VAPOR PRESSURE: 400 MMHG @ 24 C EVAPORATION RATE: (BUTYL ACETATE=1) 27.5

SOLUBILITY IN WATER: 1.32% @ 20 C ODOR THRESHOLD: 25-50 PPM

VAPOR DENSITY: 2.9

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, DIMETHYLFORMAMIDE, PHENOLS,
ALDEHYDES, KETONES, GLACIAL ACETIC ACID, TRIETHYL PHOSPHATE, ACETOACETIC ACID,
CYCLOHEXYLAMINE, CHLORINATED SOLVENTS.

VISCOSITY: 0.441 CPS @ 20 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

UPPER EXPLOSIVE LIMIT: 23% LOWER EXPLOSIVE LIMIT: 13%

AUTOIGNITION TEMP.: 1033 F (556 C) FLAMMABILITY CLASS(OSHA): IIIB

FIREFIGHTING MEDIA:
DRY CHEMICAL OR CARBON DIOXIDE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL
WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. ISOLATE FOR 1/2 MILE IN
ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990
EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 74).

EXTINGUISH USING AGENTS SUITABLE FOR SURROUNDING FIRE. USE FLOODING QUANTITIES
OF WATER TO COOL AFFECTED CONTAINERS, APPLYING FROM AS FAR A DISTANCE AS
POSSIBLE. AVOID BREATHING HAZARDOUS VAPORS, KEEP UNWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
ORM-A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.605
EXCEPTIONS: 49 CFR 173.505

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
DICHLOROMETHANE-UN 1593

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
KEEP AWAY FROM FOOD

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.153
NON-BULK PACKAGING: 49 CFR 173.203
BULK PACKAGING: 49 CFR 173.241

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 60 L
CARGO AIRCRAFT ONLY: 220 L

TOXICITY

DICHLOROMETHANE (METHYLENE CHLORIDE):
IRRITATION DATA: 162 MG EYE-RABBIT MODERATE; 10 MG EYE-RABBIT MILD;
500 MG/24 HOURS EYE-RABBIT MILD; 810 MG/24 HOURS SKIN-RABBIT SEVERE;
100 MG/24 HOURS SKIN-RABBIT MODERATE.
TOXICITY DATA: 500 PPM/1 YEAR-INTERMITTENT INHALATION-HUMAN TCLO;
500 PPM/8 HOURS INHALATION-HUMAN TCLO; 88000 MG/M3/30 MINUTES
INHALATION-RAT LC50; 14400 PPM/7 HOURS INHALATION-MOUSE LC50;

10000 PPM/7 HOURS INHALATION-RABBIT LCLO; 5000 PPM/2 HOURS INHALATION-GUINEA PIG LCLO; 14108 PPM/7 HOURS INHALATION-DOG LCLO;
 43400 MG/M3/4.5 HOURS INHALATION-CAT LCLO; 357 MG/KG ORAL-HUMAN LDLO; 1600 MG/KG ORAL-RAT LD50; 1900 MG/KG ORAL-RABBIT LDLO; 3 GM/KG ORAL-DOG LDLO;
 6460 MG/KG SUBCUTANEOUS-MOUSE LD50; 2700 MG/KG SUBCUTANEOUS-RABBIT LDLO;
 2700 MG/KG SUBCUTANEOUS-DOG LDLO; 200 MG/KG INTRAVENOUS-DOG LDLO;
 916 MG/KG INTRAPERITONEAL-RAT LD50; 950 MG/KG INTRAPERITONEAL-DOG LDLO;
 437 MG/KG INTRAPERITONEAL-MOUSE LD50; 4770 MG/KG UNREPORTED-MOUSE LD50;
 MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS);
 TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: ANTICIPATED HUMAN CARCINOGEN (NTP); HUMAN INADEQUATE EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2B). EXPOSURE BY INHALATION INCREASED THE INCIDENCE OF BENIGN AND MALIGNANT LUNG AND LIVER TUMORS IN MICE OF EACH SEX AND THE INCIDENCE OR MULTIPLICITY OF BENIGN MAMMARY TUMORS IN RATS OF EACH SEX; IN MALE RATS, AN INCREASED INCIDENCE OF SARCOMAS LOCATED IN THE NECK WAS ALSO OBSERVED.

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION AND INGESTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; CHEMICAL ASPHYXANT.

POISONING MAY AFFECT THE BLOOD, LIVER AND KIDNEYS.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH SKIN, LIVER, KIDNEY, CARDIOVASCULAR DISEASE OR ANEMIA.

ADDITIONAL DATA: CONCURRENT EXPOSURE TO OTHER SOURCES OF CARBON MONOXIDE, SMOKING, OR PHYSICAL ACTIVITY MAY INCREASE THE LEVEL OF CARBOXYHEMOGLOBIN IN THE BLOOD RESULTING IN ADDITIVE EFFECTS. ALCOHOL MAY ENHANCE THE TOXIC EFFECTS. STIMULANTS SUCH AS EPINEPHRINE MAY INDUCE CARDIAC ARRHYTHMIAS. ONE STUDY INDICATED THAT CHRONIC EXPOSURE MAY BE ASSOCIATED WITH AN INCREASED RISK OF SPONTANEOUS ABORTION. DICHLOROMETHANE CROSSES THE PLACENTA AND IS EXCRETED IN BREAST MILK.

HEALTH EFFECTS AND FIRST AID

INHALATION:

DICHLOROMETHANE (METHYLENE CHLORIDE):

IRRITANT/NARCOTIC/CHEMICAL ASPHYXANT/CARCINOGEN.

ACUTE EXPOSURE- HUMAN EXPOSURE TO 100 PPM HAS RESULTED IN UPPER RESPIRATORY TRACT IRRITATION; CONCENTRATIONS AS LOW AS 200 PPM HAVE PRODUCED TEMPORARY NEUROBEHAVIOURAL EFFECTS; 500-1000 PPM FOR 1-2 HOURS HAS CAUSED LIGHTEADEDNESS AND ELEVATED CARBOXYHEMOGLOBIN LEVEL; 2300 PPM FOR 30 MINUTES HAS CAUSED NAUSEA AND NARCOSIS; 5000 PPM HAS CAUSED HEADACHE, FATIGUE, NEURASTHENIC DISORDERS AND DIGESTIVE DISTURBANCES. OTHER SYMPTOMS MAY INCLUDE DIZZINESS, TINGLING, NUMBNESS OF THE EXTREMITIES, A SENSATION OF HEAT, A SENSATION OF FULLNESS IN THE HEAD, DRUNKENNESS, STUPOR, DULLNESS AND MENTAL CONFUSION. MASSIVE EXPOSURE MAY CAUSE PHARYNGEAL EROSION, PULMONARY EDEMA, STAGGERING, HEMOLYSIS WITH GROSS HEMATURIA, RAPID UNCONSCIOUSNESS AND DEATH. RECOVERY IS GENERALLY COMPLETE IF EXPOSURE IS TERMINATED BEFORE ANESTHETIC DEATH. EXPOSURE TO HIGH LEVELS MAY ALSO CAUSE CARDIAC ARRHYTHMIAS.

CHRONIC EXPOSURE- MORE THAN 100 WORKERS EXPOSED TO LEVELS BELOW 500 PPM HAVE DEVELOPED HEALTH PROBLEMS INCLUDING SIGNIFICANT UPPER RESPIRATORY IRRITATION, EXACERBATION OF CORONARY ARTERY DISEASE, AND A HIGH INCIDENCE OF NEUROTOXICITY; INCREASED COMPLAINTS OF CHEST PAINS WERE REPORTED AT CONCENTRATIONS OF 10 TO 35 PPM. REPEATED HUMAN EXPOSURE TO 500-3600 PPM

HAS CAUSED SIGNS OF TOXIC ENCEPHALOPATHY WITH ACOUSTICAL AND OPTICAL DELUSIONS AND HALLUCINATIONS. A CASE OF SERIOUS CEREBRAL DETERIORATION WAS OBSERVED IN AN INDIVIDUAL EXPOSED FOR SEVERAL YEARS TO DICHLOROMETHANE. IN A MORTALITY STUDY OF TWO GROUPS OF WORKERS, ONE EXPOSED TO ACETONE AND THE OTHER TO DICHLOROMETHANE AND ACETONE, A STATISTICALLY SIGNIFICANT DIFFERENCE IN DEATHS FROM DISEASES OF THE CIRCULATORY SYSTEM AND FROM ISCHEMIC HEART DISEASE WERE REPORTED FROM THE DICHLOROMETHANE AND ACETONE GROUP. IN ANOTHER MORTALITY STUDY OF WORKERS EXPOSED TO DICHLOROMETHANE, A SIGNIFICANT INCREASE IN HYPERTENSIVE DISEASE AND A "SUGGESTIVE EXCESS" OF PANCREATIC CANCER WERE REPORTED. LIVER DISEASE HAS BEEN REPORTED IN WORKERS. IN ONE STUDY, AN INCREASE IN SERUM BILIRUBIN WAS OBSERVED IN EXPOSED WORKERS, BUT NO OTHER SIGN OF LIVER INJURY OR HEMOLYSIS WAS REPORTED. ADVERSE LIVER EFFECTS WERE OBSERVED IN SEVERAL ANIMAL SPECIES CHEMICALLY EXPOSED. TESTICULAR ATROPHY WAS REPORTED IN MICE EXPOSED TO 4000 PPM OVER 2 YEARS. REPEATED INHALATION BY RODENTS PRIOR TO AND/OR DURING GESTATION CAUSED FETAL SKELETAL ABNORMALITIES AND BEHAVIORAL EFFECTS IN NEWBORN OFFSPRING. REPEATED INHALATION INCREASED THE INCIDENCE OF BENIGN AND MALIGNANT LUNG AND LIVER TUMORS IN MICE OF EACH SEX AND THE INCIDENCE OR MULTIPLICITY OF BENIGN MAMMARY TUMORS IN RATS OF EACH SEX; IN MALE RATS, AN INCREASED INCIDENCE OF SARCOMAS LOCATED IN THE NECK WAS ALSO OBSERVED.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

DICHLOROMETHANE (METHYLENE CHLORIDE):

IRRITANT.

ACUTE EXPOSURE- MAY CAUSE EFFECTS RANGING FROM MILD IRRITATION TO SEVERE PAIN, PARESTHESIAS, AND POSSIBLY BURNS, DEPENDING ON THE INTENSITY OF CONTACT.

CHRONIC EXPOSURE- PROLONGED OR REPEATED CONTACT MAY CAUSE A DRY, SCALY AND FISSURED DERMATITIS DUE TO DEFATTING ACTION OF LIQUID ON SKIN.

FIRST AID- 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.

EYE CONTACT:

DICHLOROMETHANE (METHYLENE CHLORIDE):

IRRITANT.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS ABOVE 2000 PPM MAY CAUSE IRRITATION.

DIRECT CONTACT MAY CAUSE PAIN AND EXTREME IRRITATION, BUT IT IS NOT LIKELY TO CAUSE SERIOUS INJURY. 10 MG APPLIED TO RABBIT EYES PRODUCED KERATITIS, IRITIS, INCREASED CORNEAL THICKNESS, AND INFLAMMATION OF THE CONJUNCTIVA AND EYELIDS WITH SOME EFFECTS LASTING UP TO TWO WEEKS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

DICHLOROMETHANE (METHYLENE CHLORIDE):

NARCOTIC/CHEMICAL ASPHYXIAN.

ACUTE EXPOSURE: MAY CAUSE RAPID, THEN SLOWED RESPIRATION, GLOTTAL AND PHARYNGEAL EDEMA, INTRAVASCULAR HEMOLYSIS WITH GROSS HEMATURIA, GASTROINTESTINAL ULCERATION AND HEMORRHAGE, AND CARBOXYHEMOGLOBINEMIA. THESE SYMPTOMS MAY PROGRESS RAPIDLY TO UNCONSCIOUSNESS AND LACK OF RESPONSE TO PAINFUL STIMULI. PHARYNGEAL EROSIONS MAY DISTURB THE SWALLOWING MECHANISM RESULTING IN ASPIRATION PNEUMONIA. IN ADDITION, SYMPTOMS OF CENTRAL NERVOUS SYSTEM DEPRESSION MAY OCCUR FOLLOWED BY CONVULSIONS AND PARESTHESIA OF THE EXTREMITIES. LARGE DOSES MAY CAUSE LIVER AND KIDNEY DAMAGE. THE ESTIMATED LETHAL DOSE FOR AN ADULT IS 25 GRAMS.

CHRONIC EXPOSURE- REPEATED INGESTION BY RATS AND MICE RESULTED IN HISTOMORPHOLOGICAL CHANGES IN THE LIVER.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. MAINTAIN BLOOD PRESSURE AND AIRWAY. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

DICHLOROMETHANE (METHYLENE CHLORIDE):

ALKALI METALS: POSSIBLE EXPLOSIVE REACTION.

ALUMINUM: VIOLENT, UNCONTROLLABLE REACTION ABOVE 95 C.

CAUSTICS (STRONG): VIGOROUS, POSSIBLY VIOLENT REACTION.

COPPER: MAY CORRODE AT ELEVATED TEMPERATURES IN THE PRESENCE OF MOISTURE.

DINITROGEN PENTOXIDE: POSSIBLE EXPLOSION.

DINITROGEN TETROXIDE: FORMS SHOCK-SENSITIVE MIXTURE.

IRON: MAY CORRODE AT ELEVATED TEMPERATURES IN THE PRESENCE OF MOISTURE.

LITHIUM: FORMS SHOCK-SENSITIVE MIXTURE.

MAGNESIUM: POSSIBLE EXPLOSION.

NICKEL: MAY CORRODE AT ELEVATED TEMPERATURES IN THE PRESENCE OF MOISTURE.

NITRIC ACID: EXOTHERMIC REACTION YIELDING DETONABLE SOLUTION.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

OXYGEN (LIQUID): EXPLOSIVE REACTION ON IGNITION.

PLASTICS, RUBBER, AND COATINGS: MAY BE ATTACKED.

POTASSIUM: EXPLOSIVE REACTION.
POTASSIUM HYDROXIDE + N-METHYL-N-NITROSO UREA: POSSIBLE EXPLOSION.
POTASSIUM TERT-BUTOXIDE: IGNITION REACTION.
SODIUM: FORMS SHOCK-SENSITIVE MIXTURE.
SODIUM-POTASSIUM ALLOY: FORMS SHOCK-SENSITIVE MIXTURE.
STAINLESS STEEL: MAY CORRODE AT ELEVATED TEMPERATURES IN THE PRESENCE OF MOISTURE.
TITANIUM: POSSIBLE VIOLENT REACTION.
ZINC: POSSIBLE VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND HAZARDOUS PHOSGENE GAS, TOXIC AND CORROSIVE FUMES OF CHLORIDES, AND OXIDES OF CARBON.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

PROTECT AGAINST PHYSICAL DAMAGE. STORE IN COOL, DRY, WELL VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE IN A TIGHTLY CLOSED CONTAINER.

STORE UNDER NITROGEN.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U080.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINER MAY EXPLODE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

AIR SPILL:
APPLY WATER SPRAY TO KNOCK DOWN VAPORS.

WATER SPILL:
TRAP SPILLED MATERIAL AT BOTTOM IN DEEP WATER POCKETS, EXCAVATED HOLDING AREAS OR WITHIN SAND BAG BARRIERS.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:
PROCESS ENCLOSURE RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

DICHLOROMETHANE (METHYLENE CHLORIDE):
AT ANY DETECTABLE CONCENTRATION:

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.

ESCAPE- 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.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS
SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A
FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE
EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN
AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 09/26/84 REVISION DATE: 02/25/92

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NICKEL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS16240

CAS#: 7440-02-0 FORMULA: NI

NICKEL IS A WHITE TO SILVER-GRAY METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. DUST-AIR MIXTURES MAY CATCH FIRE OR EXPLODE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: NICKEL DUST MAY CAUSE ALLERGIC REACTIONS AND IRRITATION TO THE NOSE, SKIN AND EYES. ADDITIONAL EFFECTS MAY INCLUDE COUGHING AND LUNG CONGESTION.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS AND TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS16240

7440-02-0

NICKEL

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OHS16240

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-02-0
RTECS NUMBER: QR5950000

SUBSTANCE: NICKEL

TRADE NAMES/SYNONYMS:

C.I. 77775; NICKEL ELEMENT; NI;
NICKEL 270, NICKEL 200 (MATERIALS RESEARCH CORP.); PULVERIZED NICKEL;
NICKEL PARTICLES; NI 0901-5; NP2; N-40; OHS16240

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: NI

MOLECULAR WEIGHT: 58.71

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: NICKEL
CAS# 7440-02-0

PERCENT: <100

OTHER CONTAMINANTS: WATER

EXPOSURE LIMITS:

NICKEL, METAL AND INSOLUBLE COMPOUNDS (AS NI):

1 MG/M3 OSHA TWA

1 MG/M3 ACGIH TWA (NOTICE OF INTENDED CHANGES 1989-1990)

0.015 MG/M3 NIOSH RECOMMENDED TWA

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; INDUCTIVELY COUPLED PLASMA;
(NIOSH VOL. III # 7300, ELEMENTS).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (OCTOBER 1, 1989)
(NICKEL AND CERTAIN NICKEL COMPOUNDS)

NICKEL:

100 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (OCTOBER 1, 1987)
(NICKEL REFINERY DUST FROM THE PYROMETALLURGICAL PROCESS)

PHYSICAL DATA

DESCRIPTION: WHITE TO SILVER-GRAY, MALLEABLE, DUCTILE, LUSTROUS METAL,

POWDER OR CUBIC CRYSTALS. BOILING POINT: 4946 F (2730 C)

MELTING POINT: 2651 F (1455 C) SPECIFIC GRAVITY: 8.90

VAPOR PRESSURE: 1 MMHG @ 1810 C SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN DILUTE NITRIC ACID; SLIGHTLY SOLUBLE IN
HYDROCHLORIC, SULPHURIC ACID; INSOLUBLE IN AMMONIA

MOHRS HARDNESS: 3.8

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE
FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FLASH POINT: FLAMMABLE (DUST)

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE
METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA
FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE
UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM
AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5,
GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING
MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

NICKEL:

TOXICITY DATA: 5 GM/KG ORAL-RAT LDLO; 5 MG/KG ORAL-GUINEA PIG LDLO; 12 MG/KG INTRATRACHEAL-RAT LDLO; 7500 UG/KG SUBCUTANEOUS-RABBIT LDLO; 12500 UG/KG SUBCUTANEOUS-CAT LDLO; 50 MG/KG INTRAVENOUS-MOUSE LDLO; 7 MG/KG INTRAPERITONEAL-RABBIT LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: ANTICIPATED HUMAN CARCINOGEN (NTP); HUMAN INADEQUATE EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2B FOR NICKEL). METALLIC NICKEL WAS TESTED BY INHALATION EXPOSURE IN MICE, RATS AND GUINEA-PIGS, BY INTRATRACHEAL INSTILLATION IN RATS, BY INTRAMUSCULAR INJECTION IN RATS AND HAMSTERS, AND BY INTRAPLEURAL, SUBCUTANEOUS, INTRAPERITONEAL AND INTRARENAL INJECTION IN RATS. THE STUDIES BY INHALATION EXPOSURE WERE INADEQUATE FOR AN ASSESSMENT OF CARCINOGENICITY. AFTER INTRATRACHEAL INSTILLATION, IT PRODUCED SIGNIFICANT NUMBERS OF SQUAMOUS-CELL CARCINOMAS AND ADENOCARCINOMAS OF THE LUNG. INTRAPLEURAL INJECTIONS INDUCED SARCOMAS IN RATS. SUBCUTANEOUS ADMINISTRATION OF METALLIC NICKEL PELLETS INDUCED SARCOMAS IN RATS, INTRAMUSCULAR INJECTION OF NICKEL POWDER INDUCED SARCOMAS IN RATS AND HAMSTERS, AND INTRAPERITONEAL INJECTIONS INDUCED CARCINOMAS AND SARCOMAS IN RATS.

THERE IS INADEQUATE EVIDENCE IN HUMANS AND LIMITED EVIDENCE IN EXPERIMENTAL ANIMALS FOR THE CARCINOGENICITY OF NICKEL ALLOYS. A FERRONICKEL ALLOY DID NOT INDUCE LOCAL TUMORS AFTER INTRAMUSCULAR OR INTRARENAL INJECTION IN RATS. TWO POWDERED NICKEL ALLOYS INDUCED MALIGNANT TUMORS FOLLOWING INTRAPERITONEAL INJECTION IN RATS, AND ONE NICKEL ALLOY INDUCED SARCOMAS FOLLOWING SUBCUTANEOUS IMPLANTATION OF PELLETS IN RATS.

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN.

ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.

TARGET EFFECTS: SENSITIZER- RESPIRATORY, DERMAL. POISONING MAY ALSO AFFECT THE HEART, LIVER, KIDNEYS AND BRAIN.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN OR PULMONARY DISORDERS, OR A HISTORY OF ASTHMA AND ALLERGIES.

HEALTH EFFECTS AND FIRST AID

INHALATION:

NICKEL:

IRRITANT/SENSITIZER/CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE RESPIRATORY IRRITATION, COUGH, PNEUMONITIS AND FEVER. PULMONARY EDEMA MAY BE A DELAYED SYMPTOM. PULMONARY SENSITIZATION MAY OCCUR CAUSING EOSINOPHILIC PNEUMONITIS, ASTHMA AND HOST REJECTION OF NICKEL CONTAINING PROSTHESES. TWO WORKERS EXPERIENCED SEVERE BUT TRANSIENT PNEUMONITIS AFTER BEING EXPOSED TO 0.26 MG/M3 FOR SIX HOURS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INHALATION MAY CAUSE MUCOUS

MEMBRANE IRRITATION AND PULMONARY SENSITIZATION. WORKERS EXPOSED TO NICKEL DUST FREQUENTLY DEVELOPED CHRONIC HYPERTROPHIC RHINITIS AND NASAL SINUSITIS. ANOSMIA, NASAL POLYPOSIS AND PERFORATION OF THE NASAL SEPTUM MAY ALSO OCCUR. RABBITS EXPOSED TO 1 MG/M3 DUST FOR 6 HOURS PER DAY, FIVE DAYS A WEEK FOR UP TO SIX MONTHS SHOWED TWO- TO THREE- FOLD INCREASES IN THE VOLUME DENSITY OF ALVEOLAR TYPE II CELLS. THE SIX-MONTH EXPOSURE CAUSED FOCAL PNEUMONIA. RATS INJECTED INTRATRACHEALLY ONCE A WEEK WITH 0.9 MG FOR TEN WEEKS OR 0.3 MG FOR 20 WEEKS SHOWED ADENOCARCINOMAS, SQUAMOUS-CELL CARCINOMAS, ONE ADENOMA AND ONE MIXED TUMOR.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

NICKEL:

IRRITANT/SENSITIZER.

ACUTE EXPOSURE- MAY CAUSE IRRITATION. SKIN SENSITIZATION MAY OCCUR IN PREVIOUSLY EXPOSED INDIVIDUALS. "NICKEL ITCH", A TYPE OF DERMATITIS RESULTING FROM SENSITIZATION TO NICKEL MAY BEGIN WITH A SENSATION OF BURNING AND ITCHING AT THE PLACE OF CONTACT AND USUALLY OCCURS SEVEN DAYS BEFORE THE CHARACTERISTIC SKIN ERUPTIONS APPEAR. THE PRIMARY SKIN ERUPTION IS ERYTHEMATOUS OR FOLLICULAR; IT MAY BE FOLLOWED BY SUPERFICIAL DISCRETE ULCERS WHICH DISCHARGE AND BECOME CRUSTED. THE ERUPTION MAY SPREAD TO AREAS RELATED TO THE ACTIVITY OF THE PRIMARY SITE. PIGMENTED OR DEPIGMENTED PLAQUES MAY BE FORMED. THIS SENSITIZATION REACTION MAY BE ACCOMPANIED BY FEVER, STOMATITIS, GINGIVITIS, CONJUNCTIVITIS, PAROXYSMAL ASTHMATIC ATTACKS AND EOSINOPHILIC PNEUMONITIS. RECOVERY USUALLY OCCURS WITHIN 7 DAYS AFTER EXPOSURE. NICKEL IS NOT ABSORBED THROUGH THE UNBROKEN SKIN IN AMOUNTS SUFFICIENT TO CAUSE INTOXICATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED SKIN CONTACT MAY CAUSE SENSITIZATION DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

NICKEL:

ACUTE EXPOSURE- DUST MAY BE IRRITATING TO THE EYES.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

NICKEL:

ACUTE EXPOSURE- INSOLUBLE NICKEL COMPOUNDS HAVE A LOW LEVEL OF TOXICITY DUE TO POOR ABSORPTION FROM THE GASTROINTESTINAL TRACT.

CHRONIC EXPOSURE- REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

NICKEL:

ACIDS (STRONG): POSSIBLE VIOLENT REACTION.
ALUMINUM: MAY REACT EXPLOSIVELY ON HEATING.
AMMONIA: POSSIBLE VIOLENT REACTION.
AMMONIUM NITRATE: VIOLENT OR EXPLOSIVE REACTION.
BROMINE PENTAFLUORIDE: VIOLENT REACTION WITH POSSIBLE IGNITION.
ETHYLENE + ALUMINUM CHLORIDE: VIOLENT, EXOTHERMIC REACTION.
DIOXANE: EXPLOSIVE REACTION ABOVE 210 C.
FLUORINE: VIOLENT REACTION.
HYDRAZINE: VIGOROUS DECOMPOSITION.
HYDRAZOIC ACID: VIGOROUS DECOMPOSITION.
HYDROGEN: EXOTHERMIC ABOVE 150 C.
METHANOL: POSSIBLE IGNITION.
NITRIC ACID: ATTACKS.
NITRYL FLUORIDE: INCANDESCENCE ON WARMING.
ORGANIC SOLVENTS: POSSIBLE EXPLOSION ON HEATING.
OXIDANTS: VIOLENT REACTION.
PERFORMIC ACID: VIOLENT REACTION.
PHOSPHORUS: INCANDESCENCE ON HEATING.
POTASSIUM PERCHLORATE, TITANIUM, AND INFUSORIAL EARTH: SHOCK-SENSITIVE MIXTURE.
SELENIUM: INCANDESCENT REACTION WITH HEATING.
SULFUR AND COMPOUNDS: INCANDESCENT REACTION WITH HEATING.

DECOMPOSITION:

NICKEL:

MAY FORM TOXIC AND HIGHLY FLAMMABLE NICKEL CARBONYL UNDER THERMAL DECOMPOSITION.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT MATERIAL FROM DISSOLVING IN FIRE EXTINGUISHING WATER OR RAIN.

WATER SPILL:

TRAP SPILLED MATERIAL AT BOTTOM IN DEEP WATER POCKETS, EXCAVATED HOLDING AREAS OR WITHIN SAND BAG BARRIERS.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL SPILLS, WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, WET DOWN WITH WATER AND DIKE FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

REPORTABLE QUANTITY (RQ): 100 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

NICKEL AND COMPOUNDS:

AT ANY DETECTABLE CONCENTRATION:

ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST NICKEL AND COMPOUNDS.

ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY

BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH
FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/14/84 REVISION DATE: 04/13/92

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NIOBIMUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS16510

CAS#: 7440-03-1 FORMULA: NB

NIOBIMUM IS A GRAY METAL.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE AND THROAT.

LONG TERM EXPOSURE: MAY CAUSE LUNG, BLOOD, AND LIVER CHANGES.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS16510

7440-03-1

NIOBIMUM

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MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: NIOBIUM

CAS NUMBER: 7440-03-1

TRADE NAMES/SYNONYMS:

COLUMBIUM; NIOBIUM ELEMENT; NIOBIUM METAL; NB; OHS16510

CHEMICAL FAMILY:

METAL

MOLECULAR FORMULA: NB

MOLECULAR WEIGHT: 92.91

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: NIOBIUM
CAS# 7440-03-1

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: LUSTROUS, STEEL GRAY METAL. BOILING POINT: 9261 F (5127 C)

MELTING POINT: 4456-4492 F (2458-2478 C) SPECIFIC GRAVITY: 8.57

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN FUSED ALKALIES, HYDROFLUORIC-NITRIC ACID
MIXTURES, HOT SULFURIC, HYDROCHLORIC AND PHOSPHORIC ACIDS; INSOLUBLE IN COLD
HYDROCHLORIC AND NITRIC ACIDS, AND AQUA REGIA.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

NIOBIUM:

CARCINOGEN STATUS: NONE.

ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.

TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

NIOBIUM:

ACUTE EXPOSURE- INHALATION MAY CAUSE IRRITATION OF THE MUCOUS MEMBRANES.

INHALED PARTICLES MAY BE RETAINED IN THE LUNGS.

CHRONIC EXPOSURE- NO DATA AVAILABLE. REPEATED OR PROLONGED EXPOSURE TO A

NIOBIUM COMPOUND RESULTED IN SIGNS OF PNEUMOCONIOSIS INCLUDING THICKENING OF THE INTERALVEOLAR SEPTA, DEVELOPMENT OF CONSIDERABLE AMOUNTS OF COLLAGENOUS FIBERS IN THE PERIBRONCHIAL AND PERIVASCULAR TISSUE, AND DESQUAMATION OF THE BRONCHIAL EPITHELIUM.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

NIOBIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

NIOBIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

NIOBIUM:

ACUTE EXPOSURE- METALLIC NIOBIUM HAS A LOW ORDER OF TOXICITY DUE TO POOR ABSORPTION FROM STOMACH AND INTESTINES.

CHRONIC EXPOSURE- NO SPECIFIC DATA AVAILABLE. LIFETIME INGESTION OF NIOBIUM AS A SALT RESULTED IN TEMPORARY BLOOD CHANGES INCLUDING LEUKOCYTOSIS AND PROTHROMBIN DEFICIENCY, GLYCOSURIA, LOWERED AMOUNTS OF URINARY PROTEIN, AND HEPATIC LIVER CHANGES IN EXPERIMENTAL ANIMALS. NIOBIUM CROSSES THE PLACENTAL BARRIER IN ANIMALS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

NIOBium:

BROMINE TRIFLUORIDE: INCANDESCENT REACTION.

CHLORINE: IGNITES AT 205 C.

FLUORINE: INCANDESCENT REACTION.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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NITRIC ACID MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS16550

CAS#: 7697-37-2 FORMULA: HNO₃

NITRIC ACID IS A COLORLESS TO YELLOW LIQUID WITH A STRONG ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD BY ITSELF; HOWEVER, THE MATERIAL IS AN OXIDIZER. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, MOUTH, STOMACH, SKIN, AND EYES WITH POSSIBLE BLINDNESS. ADDITIONAL EFFECTS MAY INCLUDE THIRST, HEADACHE, LUNG CONGESTION, NAUSEA, VOMITING BLOOD, STOMACH PAIN, DIARRHEA, DIZZINESS, COUGHING, CHOKING, DIFFICULTY SWALLOWING AND SPEAKING, STOMACH DAMAGE, SEIZURES, AND UNCONSCIOUSNESS. DEATH IS POSSIBLE BY INHALATION.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, TOOTH AND JAW DAMAGE, MOUTH ULCERS, AND LUNG DAMAGE MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

NORMALLY STABLE, BUT MAY REACT WITH WATER GENERATING HEAT. CONTACT WITH FLAMMABLE OR COMBUSTIBLE MATERIALS MAY RESULT IN A FIRE OR EXPLOSION. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS16550

7697-37-2

NITRIC ACID

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OHS16550

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: NITRIC ACID

CAS NUMBER: 7697-37-2
RTECS NUMBER: QU5775000

TRADE NAMES/SYNONYMS:

AQUA FORTIS; WFNA; RFNA; HYDROGEN NITRATE; AZOTIC ACID; NITRYL HYDROXIDE;
NITAL; AQUAFORTIS HYDROGEN NITRATE (EM SCIENCE); STCC 4918528; UN 2031;
HNO3; OHS16550

CHEMICAL FAMILY:
INORGANIC ACID

MOLECULAR FORMULA: H-N-O3

MOLECULAR WEIGHT: 63.01

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: NITRIC ACID

PERCENT: 70

COMPONENT: WATER

PERCENT: 30

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NITRIC ACID:

2 PPM (5 MG/M3) OSHA TWA; 4 PPM (10 MG/M3) OSHA STEL
2 PPM (5 MG/M3) ACGIH TWA; 4 PPM (10 MG/M3) ACGIH STEL
2 PPM (5 MG/M3) NIOSH RECOMMENDED TWA;
4 PPM (10 MG/M3) NIOSH RECOMMENDED STEL
10 PPM (25 MG/M3) DFG MAK TWA;
20 PPM (50 MG/M3) DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; SODIUM BICARBONATE/SODIUM CARBONATE;
ION CHROMATOGRAPHY; (NIOSH VOL. III # 7903, INORGANIC ACIDS).

1000 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
1000 POUNDS SARA SECTION 304 REPORTABLE QUANTITY

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS TO PALE YELLOW LIQUID WITH A SUFFOCATING ODOR.

BOILING POINT: 181 F (83 C) MELTING POINT: -44 F (-42 C)

SPECIFIC GRAVITY: 1.5027 @ 25 C VAPOR PRESSURE: 47.9 MMHG @ 20 C

EVAPORATION RATE: NOT AVAILABLE SOLUBILITY IN WATER: VERY SOLUBLE

VAPOR DENSITY: 3.2

SOLVENT SOLUBILITY: SOLUBLE IN ETHER.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER. CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:
WATER, DRY CHEMICAL OR SODA ASH
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 44).

USE FLOODING AMOUNTS OF WATER AS FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
OXIDIZER

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
OXIDIZER AND CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.268
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
NITRIC ACID-UN 2031

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
8 - CORROSIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG I

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
CORROSIVE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.158
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 2.5 L

TOXICITY

NITRIC ACID:
TOXICITY DATA:
ANHYDROUS: 49 PPM/4 HOURS INHALATION-RAT LC50 (VAN WATER & ROGERS, INC
MSDS); 2500 PPM/1 HOUR INHALATION-RAT LC50 (DUPONT MSDS); 430 MG/KG
ORAL-HUMAN LDLO; 50-500 MG/KG ORAL-UNSPECIFIED SPECIES LD50 (DUPONT MSDS);
110 MG/KG UNREPORTED-MAN LDLO; REPRODUCTIVE EFFECTS DATA (RTECS).
MONOHYDRATE: NO DATA AVAILABLE.
TRIHYDRATE: NO DATA AVAILABLE.
CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYES, INGESTION.
 ACUTE TOXICITY LEVEL: HIGHLY TOXIC BY INHALATION; TOXIC BY INGESTION.
 TARGET EFFECTS: NO DATA AVAILABLE.
 AT INCREASED RISK FROM EXPOSURE: PERSONS WITH IMPAIRED PULMONARY FUNCTION,
 PRE-EXISTING EYE AND SKIN DISORDERS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

NITRIC ACID:

CORROSIVE/HIGHLY TOXIC. 100 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF ACIDIC SUBSTANCES MAY CAUSE SEVERE RESPIRATORY IRRITATION WITH COUGHING, CHOKING, AND POSSIBLY YELLOWISH BURNS OF THE MUCOUS MEMBRANES. OTHER INITIAL SYMPTOMS MAY INCLUDE DIZZINESS, HEADACHE, NAUSEA, AND WEAKNESS. PULMONARY EDEMA MAY BE IMMEDIATE IN THE MOST SEVERE EXPOSURES, BUT MORE LIKELY WILL OCCUR AFTER A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE TIGHTNESS IN THE CHEST, DYSPNEA, DIZZINESS, FROTHY SPUTUM, AND CYANOSIS. PHYSICAL FINDINGS MAY INCLUDE HYPOTENSION, WEAK, RAPID PULSE, MOIST RALES, AND HEMOCONCENTRATION. IN NON-FATAL CASES, COMPLETE RECOVERY MAY OCCUR WITHIN A FEW DAYS OR WEEKS OR, CONVALESCENCE MAY BE PROLONGED WITH FREQUENT RELAPSES AND CONTINUED DYSPNEA AND OTHER SIGNS AND SYMPTOMS OF PULMONARY INSUFFICIENCY. IN SEVERE EXPOSURES, DEATH DUE TO ANOXIA MAY OCCUR WITHIN A FEW HOURS AFTER ONSET OF THE SYMPTOMS OF PULMONARY EDEMA OR FOLLOWING A RELAPSE.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED EXPOSURE TO AN ACIDIC SUBSTANCE MAY CAUSE EROSION OF THE TEETH, INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH, AND POSSIBLY JAW NECROSIS. BRONCHIAL IRRITATION WITH COUGH AND FREQUENT ATTACKS OF BRONCHIAL PNEUMONIA MAY OCCUR. GASTROINTESTINAL DISTURBANCES ARE ALSO POSSIBLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

NITRIC ACID:

CORROSIVE.

ACUTE EXPOSURE- DIRECT CONTACT WITH LIQUID OR VAPOR MAY CAUSE SEVERE PAIN, BURNS AND POSSIBLY YELLOWISH STAINS. BURNS MAY BE DEEP WITH SHARP EDGES AND HEAL SLOWLY WITH SCAR TISSUE FORMATION. DILUTE SOLUTIONS OF NITRIC ACID MAY PRODUCE MILD IRRITATION AND HARDEN THE EPIDERMIS WITHOUT DESTROYING IT. CONCENTRATED ACID SOLUTIONS APPLIED TO OVER 25% OF THE SKIN AREA IN RATS PRODUCED ELEVATED METHEMOGLOBIN AND BLOOD NITRATE LEVELS.

CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH ACIDIC SUBSTANCES MAY RESULT IN DERMATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
NITRIC ACID:
CORROSIVE.

ACUTE EXPOSURE- DIRECT CONTACT WITH ACIDIC SUBSTANCES MAY CAUSE PAIN AND LACRIMATION, PHOTOPHOBIA, AND BURNS, POSSIBLY SEVERE. THE DEGREE OF INJURY DEPENDS ON THE CONCENTRATION AND DURATION OF CONTACT. IN MILD BURNS, THE EPITHELIUM REGENERATES RAPIDLY AND THE EYE RECOVERS COMPLETELY. IN SEVERE CASES, THE EXTENT OF INJURY MAY NOT BE FULLY APPARENT FOR SEVERAL WEEKS. ULTIMATELY, THE WHOLE CORNEA MAY BECOME DEEPLY VASCULARIZED AND OPAQUE RESULTING IN BLINDNESS. IN THE WORST CASES, THE EYE MAY BE TOTALLY DESTROYED. CONCENTRATED NITRIC ACID MAY IMPART A YELLOW COLOR TO THE EYE UPON CONTACT.

CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED EXPOSURE TO ACIDIC SUBSTANCES MAY CAUSE CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
NITRIC ACID:
CORROSIVE/TOXIC.

ACUTE EXPOSURE- ACIDIC SUBSTANCES MAY CAUSE CIRCUMORAL BURNS WITH YELLOW DISCOLORATION AND CORROSION OF THE MUCOUS MEMBRANES OF THE MOUTH, THROAT AND ESOPHAGUS. THERE MAY BE IMMEDIATE PAIN AND DIFFICULTY OR INABILITY TO SWALLOW OR SPEAK. EPIGLOTTAL EDEMA MAY RESULT IN RESPIRATORY DISTRESS AND POSSIBLY ASPHYXIA. MARKED THIRST, EPIGASTRIC PAIN, NAUSEA, VOMITING AND DIARRHEA MAY OCCUR. DEPENDING ON THE DEGREE OF ESOPHAGEAL AND GASTRIC CORROSION, THE VOMITUS MAY CONTAIN FRESH OR DARK PRECIPITATED BLOOD AND LARGE SHREDS OF MUCOSA. SHOCK WITH MARKED HYPOTENSION, WEAK, RAPID PULSE, SHALLOW RESPIRATION, AND CLAMMY SKIN MAY OCCUR. CIRCULATORY COLLAPSE MAY ENSUE AND IF UNCORRECTED, LEAD TO RENAL FAILURE. IN SEVERE CASES, GASTRIC, AND TO A LESSER DEGREE, ESOPHAGEAL PERFORATION AND SUBSEQUENT PERITONITIS MAY OCCUR AND BE ACCOMPANIED BY FEVER AND ABDOMINAL RIGIDITY. ESOPHAGEAL, GASTRIC AND PYLORIC STRICTURE MAY OCCUR WITHIN A FEW WEEKS, BUT MAY BE DELAYED FOR MONTHS OR EVEN YEARS. DEATH MAY RESULT WITHIN A SHORT TIME FROM ASPHYXIA, CIRCULATORY COLLAPSE OR ASPIRATION OF EVEN MINUTE AMOUNTS. LATER DEATH MAY BE DUE TO PERITONITIS, SEVERE NEPHRITIS OR PNEUMONIA. COMA AND CONVULSIONS SOMETIMES OCCUR TERMINALLY.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION OF ACIDIC SUBSTANCES MAY RESULT IN INFLAMMATORY AND ULCERATIVE CHANGES IN THE MUCOUS MEMBRANES OF THE MOUTH AND OTHER EFFECTS AS IN ACUTE INGESTION. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY

BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS, ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY**REACTIVITY:**

REACTS EXOTHERMICALLY WITH WATER.

INCOMPATIBILITIES:**NITRIC ACID:**

ACETIC ACID: MAY REACT EXPLOSIVELY.

ACETIC ANHYDRIDE: EXPLOSIVE REACTION BY FRICTION OR IMPACT.

ACETONE: MAY REACT EXPLOSIVELY.

ACETONITRILE: EXPLOSIVE MIXTURE.

4-ACETOXY-3-METHOXYBENZALDEHYDE: EXOTHERMIC REACTION.

ACROLEIN: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ACRYLONITRILE: EXPLOSIVE REACTION AT 90 C.

ACRYLONITRILE-METHACRYLATE COPOLYMER: INCOMPATIBLE.

ALCOHOLS: POSSIBLE VIOLENT REACTION OR EXPLOSION; FORMATION OF EXPLOSIVE COMPOUND IN THE PRESENCE OF HEAVY METALS.

ALKANETHIOLS: EXOTHERMIC REACTION WITH POSSIBLE IGNITION.

2-ALKOXY-1,3-DITHIA-2-PHOSPHOLANE: IGNITION REACTION.

ALLYL ALCOHOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ALLYL CHLORIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

AMINES (ALIPHATIC OR AROMATIC): POSSIBLE IGNITION REACTION.

2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

2-AMINOTHIAZOLE: EXPLOSIVE REACTION.

AMMONIA (GAS): BURNS IN AN ATMOSPHERE OF NITRIC ACID VAPOR.

AMMONIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

AMMONIUM NITRATE: FORMS EXPLOSIVE MIXTURE.

ANILINE: IGNITES ON CONTACT.

ANILINIUM NITRATE: FORMS EXPLOSIVE SOLUTION.

ANION EXCHANGE RESINS: POSSIBLE VIOLENT EXOTHERMIC REACTION.

ANTIMONY: VIOLENT REACTION.

ARSINE: EXPLOSIVE REACTION.

ARSINE-BORON TRIBROMIDE: VIOLENT OXIDATION.

BASES: REACTS.

BENZENE: EXPLOSIVE REACTION.

BENZIDINE: SPONTANEOUS IGNITION.

BENZONITRILE: POSSIBLE EXPLOSION.

BENZOTHIOPHENE DERIVATIVES: FORMATION OF POSSIBLY EXPLOSIVE COMPOUNDS.

N-BENZYL-N-ETHYLANILINE: VIGOROUS DECOMPOSITION.

1,4-BIS(METHOXYMETHYL)2,3,5,6-TETRAMETHYLBENZENE: GAS EVOLUTION.

BISMUTH: INTENSE EXOTHERMIC REACTION OR EXPLOSION.

1,3-BIS(TRIFLUOROMETHYL)BENZENE: POSSIBLE EXPLOSION.

BORON: VIOLENT REACTION WITH INCANDESCENCE.

BORON DECAHYDRIDE: EXPLOSIVE REACTION.
BORON PHOSPHIDE: IGNITION REACTION.
BROMINE PENTAFLUORIDE: IGNITION REACTION.
N-BUTYL MERCAPTAN: IGNITION REACTION.
N-BUTYRALDEHYDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
CADMIUM PHOSPHIDE: EXPLOSIVE REACTION.
CALCIUM HYPOPHOSPHITE: IGNITION REACTION.
CARBON (PULVERIZED): VIOLENT REACTION.
CELLULOSE: FORMS EASILY COMBUSTIBLE ESTER.
CHLORATES: REACTS.
CHLORINE: INCOMPATIBLE.
CHLORINE TRIFLUORIDE: VIOLENT REACTION.
CHLOROBENZENE: POSSIBLE EXPLOSION.
4-CHLORO-2-NITROANILINE: FORMS EXPLOSIVE COMPOUND.
CHLOROSULFONIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
COAL: EXPLOSIVE MIXTURE.
COATINGS: MAY BE ATTACKED.
CRESOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
CROTONALDEHYDE: VIOLENT DECOMPOSITION WITH IGNITION.
CUMENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
CUPRIC NITRIDE: EXPLOSIVE REACTION.
CUPROUS NITRIDE: VIOLENT REACTION.
CYANATES: POSSIBLE EXPLOSIVE REACTION.
CYCLOHEXANONE: VIOLENT REACTION.
CYCLOHEXYLAMINE: FORMS EXPLOSIVE COMPOUND.
CYCLOPENTADIENE: EXPLOSIVE REACTION.
1,2-DIAMINOETHANE BIS(TRIMETHYLGOLD): EXPLOSIVE REACTION.
DIBORANE: SPONTANEOUS IGNITION.
DI-2-BUTOXYETHYL ETHER: VIOLENT DECOMPOSITION REACTION.
2,6-DI-T-BUTYL PHENOL: FORMATION OF EXPLOSIVE COMPOUND.
DICHLOROETHANE: FORMS SHOCK AND HEAT SENSITIVE MIXTURE.
DICHLOROETHYLENE: FORMS EXPLOSIVE COMPOUND.
DICHLOROMETHANE: FORMS EXPLOSIVE SOLUTION.
DICYCLOPENTADIENE: SPONTANEOUS IGNITION.
DIENES: IGNITION REACTION.
DIETHYLAMINO ETHANOL: POSSIBLE EXPLOSION.
DIETHYL ETHER: POSSIBLE EXPLOSION.
3,6-DIHYDRO-1,2,2H-OXAZINE: EXPLOSIVE INTERACTION.
DIISOPROPYL ETHER: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
DIMETHYLAMINOMETHYLFERROCENE: VIOLENT DECOMPOSITION IF HEATED.
DIMETHYL ETHER: FORMS EXPLOSIVE COMPOUND.
DIMETHYL HYDRAZINE: IGNITES ON CONTACT.
DIMETHYL SULFOXIDE + 1,4-DIOXANE: EXPLOSION.
DIMETHYL SULFOXIDE + <14% WATER: EXPLOSIVE REACTION.
DINITROBENZENE: EXPLOSION HAZARD.
DINITROTOLUENE: EXPLOSIVE REACTION.
DIOXANE + PERCHLORIC ACID: POSSIBLE EXPLOSION.
DIPHENYL DISTIBENE: EXPLOSIVE OXIDATION.
DIPHENYL MERCURY + CARBON DISULFIDE: VIOLENT REACTION.
DIPHENYL TIN: IGNITION REACTION.
DISODIUM PHENYL ORTHOPHOSPHATE: VIOLENT EXPLOSION.
DIVINYL ETHER: POSSIBLE IGNITION REACTION.
EPICHLOROHYDRIN: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ETHANESULFONAMIDE: EXPLOSIVE REACTION.

ETHOXY-ETHYLENE DITHIOPHOSPHATE: IGNITION ON CONTACT.
M-ETHYL ANILINE: IGNITION REACTION.
ETHYLENE DIAMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ETHYLENE GLYCOL: FORMS SHOCK AND HEAT SENSITIVE MIXTURE.
ETHYLENEIMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
5-ETHYL-2-METHYL PYRIDINE: EXPLOSIVE REACTION.
ETHYL PHOSPHINE: IGNITION REACTION.
5-ETHYL-2-PICOLINE: FORMS EXPLOSIVE COMPOUNDS.
FERROUS OXIDE (POWDERED): INTENSE EXOTHERMIC REACTION.
FLUORINE: POSSIBLE EXPLOSIVE REACTION.
FORMIC ACID: EXOTHERMIC REACTION WITH RELEASE OF TOXIC GASES.
2-FORMYLAMINO-1-PHENYL-1,3-PROPANEDIOL: POSSIBLE EXPLOSION.
FUEL OIL (BURNING): EXPLOSION.
FULMINATES: REACTS.
FURFURYLIDENE KETONES: IGNITES ON CONTACT.
GERMANIUM: VIOLENT REACTION.
GLYCEROL: POSSIBLE EXPLOSION.
GLYOXAL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
HEXALITHIUM DISILICIDE: EXPLOSIVE REACTION.
HEXAMETHYLBENZENE: POSSIBLE EXPLOSION.
2,2,4,4,6,6-HEXAMETHYLTRITHIANE: EXPLOSIVE OXIDATION.
HEXENAL: EXPLODES ON HEATING.
HYDRAZINE: VIOLENT REACTION.
HYDRAZOIC ACID: ENERGETIC REACTION.
HYDROGEN IODIDE: IGNITION REACTION.
HYDROGEN PEROXIDE: FORMS UNSTABLE MIXTURE.
HYDROGEN PEROXIDE AND KETONES: FORMS EXPLOSIVE PRODUCTS.
HYDROGEN PEROXIDE AND MERCURIC OXIDE: FORMS EXPLOSIVE COMPOUNDS.
HYDROGEN PEROXIDE AND THIOUREA: FORMS EXPLOSIVE COMPOUNDS.
HYDROGEN SELENIDE: IGNITION REACTION.
HYDROGEN SULFIDE: INCANDESCENT REACTION.
HYDROGEN TELLURIDE: IGNITION AND POSSIBLE EXPLOSIVE REACTION.
INDANE AND SULFURIC ACID: EXPLOSIVE REACTION.
ISOPRENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
KETONES (CYCLIC): VIOLENT REACTION.
LACTIC ACID + HYDROFLUORIC ACID: EXPLOSIVE REACTION.
LITHIUM: IGNITION REACTION.
LITHIUM SILICIDE: INCANDESCENT REACTION.
MAGNESIUM: EXPLOSIVE REACTION.
MAGNESIUM + 2-NITROANILINE: MAY IGNITE ON CONTACT.
MAGNESIUM PHOSPHIDE: INCANDESCENT REACTION.
MAGNESIUM SILICIDE: VIOLENT REACTION.
MAGNESIUM-TITANIUM ALLOY: FORMS SHOCK AND HEAT SENSITIVE MIXTURE.
MANGANESE (POWDERED): INCANDESCENCE AND POSSIBLE EXPLOSION.
MESITYL OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
MESITYLENE: POSSIBLE EXPLOSIVE REACTION.
METALS: VIOLENT REACTION WITH EXPLOSION OR IGNITION.
METAL ACETYLIDES: VIOLENT OR EXPLOSIVE REACTION.
METAL CARBIDES: VIOLENT OR EXPLOSIVE REACTION.
METAL CYANIDES: EXPLOSIVE REACTIONS.
METAL FERRICYANIDE OR FERROCYANIDE: VIOLENT REACTION.
METAL SALICYLATES: FORMS EXPLOSIVE COMPOUNDS.
METAL THIOCYANATES: POSSIBLE EXPLOSION.
2-METHYLBENZIMIDAZOLE + SULFURIC ACID: POSSIBLE EXPLOSIVE REACTION.

4-METHYLCYCLOHEXANONE: EXPLOSIVE REACTION.
2-METHYL-5-ETHYLPYRIDINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
METHYL THIOPHENE: IGNITION REACTION.
NEODYMIUM PHOSPHIDE: VIOLENT REACTION.
NICKEL TETRAPHOSPHIDE: IGNITION REACTION.
NITRO AROMATIC HYDROCARBONS: FORMS HIGHLY EXPLOSIVE PRODUCTS.
NITROBENZENE: EXPLOSIVE REACTION, ESPECIALLY IN THE PRESENCE OF WATER.
NITROMETHANE: EXPLOSIVE REACTION.
NITRONAPHTHALENE: EXPLOSION HAZARD.
NON-METAL OXIDES : EXPLOSIVE REACTION.
OLEUM: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ORGANIC MATERIALS: FIRE AND EXPLOSION HAZARD.
ORGANIC SUBSTANCES AND PERCHLORATES: POSSIBLE EXPLOSION.
ORGANIC SUBSTANCES AND SULFURIC ACID: POSSIBLE EXPLOSION.
PHENYL ACETYLENE + 1,1-DIMETHYLHYDRAZINE: VIOLENT REACTION.
PHENYL ORTHOPHOSPHORIC ACID DISODIUM SALT: FORMS EXPLOSIVE PRODUCTS.
PHOSPHINE + OXYGEN: SPONTANEOUS IGNITION.
PHOSPHONIUM IODIDE: IGNITION REACTION.
PHOSPHORUS (VAPOR): IGNITES WHEN HEATED.
PHOSPHOROUS HALIDES: IGNITION REACTION.
PHOSPHORUS TETRAIODIDE: VIGOROUS REACTION.
PHOSPHORUS TRICHLORIDE: EXPLOSIVE REACTION.
PHTHALIC ACID AND SULFURIC ACID: POSSIBLE EXPLOSIVE REACTION.
PHTHALIC ANHYDRIDE: EXOTHERMIC REACTION AND FORMS EXPLOSIVE PRODUCTS.
PICRATES: REACTS.
PLASTICS: MAY BE ATTACKED.
POLYALKENES: INTENSE REACTION..
POLYDIBROMOSILANES: EXPLOSIVE REACTION.
POLY(ETHYLENE OXIDE) DERIVATIVES: POSSIBLE EXPLOSION.
POLYPROPYLENE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
POLY(SILYLENE): IGNITION.
POLYURETHANE (FOAM): VIGOROUS REACTION.
POTASSIUM HYPOPHOSPHITE: EXPLOSIVE REACTION.
POTASSIUM PHOSPHINATE: EXPLODES ON EVAPORATION.
B-PROPIOLACTONE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
PROPIOPHENONE + SULFURIC ACID: EXOTHERMIC REACTION ABOVE -5 C.
PROPYLENE GLYCOL + HYDROFLUORIC ACID + SILVER NITRATE: EXPLOSIVE MIXTURE.
PROPYLENE OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
PYRIDINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
PYROCATECHOL: IGNITES ON CONTACT.
REDUCING AGENTS: POSSIBLE EXPLOSIVE OR IGNITION REACTION.
RESORCINOL: POSSIBLE EXPLOSION.
RUBBER: VIGOROUS REACTION, POSSIBLE EXPLOSION.
SELENIUM: VIGOROUS REACTION.
SELENIUM HYDRIDE: IGNITION OR INCANDESCENT REACTION.
SELENIUM IODOPHOSPHIDE: EXPLOSIVE REACTION.
SILICON: VIOLENT REACTION.
SILICONE OIL: POSSIBLE EXPLOSION.
SILVER BUTEN-3-YNIDE: EXPLOSION.
SODIUM: SPONTANEOUS IGNITION.
SODIUM AZIDE: EXOTHERMIC REACTION.
SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.
STIBINE: EXPLOSIVE REACTION.

SUCROSE (SOLID): VIGOROUS REACTION.
SULFAMIC ACID: VIOLENT REACTION WITH EVOLUTION OF TOXIC NITROUS OXIDE.
SULFIDES: REACTS.
SULFUR DIOXIDE: EXPLOSIVE REACTION.
SULFUR HALIDES: VIOLENT REACTION.
SULFURIC ACID + GLYCERIDES: EXPLOSIVE REACTION.
SULFURIC ACID + TEREPHTHALIC ACID: VIOLENT REACTION.
SURFACTANTS + PHOSPHORIC ACID: EXPLOSION HAZARD.
TERPENES: SPONTANEOUS IGNITION.
TETRABORANE: EXPLOSIVE REACTION.
TETRABORANE DECAHYDRIDE: EXPLOSIVE REACTION.
TETRAPHOSPHOROUS DIIODOTRISELENIDE: EXPLOSIVE REACTION.
TETRAPHOSPHOROUS IODIDE: IGNITES ON CONTACT.
TETRAPHOSPHOROUS TETRAOXIDE TRISULFIDE: VIOLENT REACTION.
THIOALDEHYDES: VIOLENT REACTION.
THIOKETONES: VIOLENT REACTION.
THIOPHENES: EXPLOSIVE REACTION.
TITANIUM: FORMS SHOCK-SENSITIVE COMPOUND.
TITANIUM ALLOYS: POSSIBLE EXPLOSIVE REACTION.
TITANIUM-MAGNESIUM ALLOY: POSSIBLE EXPLOSION ON IMPACT.
TOLUENE: VIOLENT REACTION.
TOLUIDENE: IGNITION REACTION.
1,3,5-TRIACETYLHEXAHYDRO-1,3,5-TRIAZINE + TRIFLUOROACETIC ANHYDRIDE:
EXPLOSIVE REACTION.
TRIAZINE: VIOLENTLY EXPLOSIVE REACTION.
TRICADMIUM DIPHOSPHIDE: EXPLOSIVE REACTION.
TRIETHYLGALLIUM MONOETHYL ETHER COMPLEX: IGNITION REACTION.
TRIMETHYLTRIOXANE: INTENSE REACTION.
TRIS(IODOMERCURI)PHOSPHINE: VIOLENT DECOMPOSITION.
TRITHIOACETONE: EXPLOSIVE REACTION.
TURPENTINE: EXPLOSIVE MIXTURE.
UNSYMMETRICAL DIMETHYL HYDRAZINE: SPONTANEOUS IGNITION.
URANIUM: EXPLOSIVE REACTION.
URANIUM ALLOY: VIOLENT REACTION.
URANIUM DISULFIDE: VIOLENT REACTION.
URANIUM-NEODYMIUM ALLOYS: EXPLOSIVE REACTION.
VINYL ACETATE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
VINYLIDENE CHLORIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
WOOD: POSSIBLE IGNITION.
P-XYLENE: INTENSE REACTION IN PRESENCE OF SULFURIC ACID.
ZINC: INCANDESCENT REACTION.
ZINC ETHOXIDE: POSSIBLE EXPLOSION.
ZIRCONIUM-URANIUM ALLOYS: EXPLOSIVE REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF NITROGEN.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

PROTECT AGAINST PHYSICAL DAMAGE. SEPARATE FROM METALLIC POWDERS, CARBIDES, HYDROGEN SULFIDE, TURPENTINE, ORGANIC ACIDS, AND ALL COMBUSTIBLE, ORGANIC OR OTHER READILY OXIDIZABLE MATERIALS. PROVIDE GOOD VENTILATION AND AVOID DIRECT SUNLIGHT (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). REACTS VIOLENTLY WITH WATER AND FUELS. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

CONSULT NFPA PUBLICATION 43A, STORAGE OF LIQUID AND SOLID OXIDIZING MATERIALS, FOR STORAGE REQUIREMENTS.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT AND LATER DISPOSAL.

WATER SPILL:
ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

OCCUPATIONAL SPILL:
KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT GET WATER INSIDE CONTAINER. FOR SMALL SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:
PROCESS ENCLOSURE RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

NITRIC ACID:

50 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW MODE.

100 PPM- ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST NITRIC ACID.*
ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND CARTRIDGE(S) PROVIDING PROTECTION AGAINST NITRIC ACID.*

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST NITRIC ACID.*
ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

* ONLY NONOXIDIZABLE SORBENTS ARE ALLOWED (NOT CHARCOAL).

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/04/84 REVISION DATE: 02/25/92

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NITROBENZENE, LIQUID MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS16590

CAS#: 98-95-3

FORMULA: C₆H₅NO₂

NITROBENZENE IS A COLORLESS, YELLOW, OR BROWN LIQUID WITH A BITTER-ALMOND ODOR. IF YOU CAN SMELL IT YOU MAY BE EXCEEDING THE EXPOSURE LIMIT.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 190 F (88 C). MODERATE FIRE HAZARD. VAPOR-AIR MIXTURES MAY BE EXPLOSIVE. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES, AND ALLERGIC REACTIONS. ADDITIONAL EFFECTS MAY INCLUDE BLUISH COLOR OF THE SKIN, LIPS AND FINGERNAILS, NAUSEA, VOMITING, SEVERE HEADACHE, TWITCHING, NUMBNESS, DIFFICULTY BREATHING, BLOODY DIARRHEA, STOMACH PAIN, YELLOW SKIN AND EYE COLOR, PAIN ON URINATION, IRREGULAR HEARTBEAT, UNCONSCIOUSNESS, AND SEIZURES. DRINKING ALCOHOL MAY WORSEN THE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, EFFECTS OF THE NERVOUS SYSTEM AND BLOOD PRODUCTION, AND DAMAGE OF THE SPLEEN, KIDNEYS, AND LIVER MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS16590

98-95-3

NITROBENZENE, LIQUID

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OHS16590

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 98-95-3
RTECS NUMBER: DA6475000

SUBSTANCE: NITROBENZENE, LIQUID

TRADE NAMES/SYNONYMS:

BENZENE, NITRO-; ESSENCE OF MIRBANE; ESSENCE OF MYRBANE; MIRBANE OIL;
NITROBENZOL; OIL OF MIRBANE; OIL OF MYRBANE; NITROBENZENE; RCRA U169;
STCC 4921455; UN 1662; C6H5NO2; OHS16590

CHEMICAL FAMILY:
NITRO

HYDROCARBON, AROMATIC

MOLECULAR FORMULA: N-O2-(C6-H5)

MOLECULAR WEIGHT: 123.12

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=2 REACTIVITY=0 PERSISTENCE=2
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=2 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: NITROBENZENE
CAS# 98-95-3

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NITROBENZENE:

- 1 PPM (5 MG/M3) OSHA TWA (SKIN)
- 1 PPM (5 MG/M3) ACGIH TWA (SKIN)
- 1 PPM (5 MG/M3) NIOSH RECOMMENDED TWA (SKIN)
- 1 PPM (5 MG/M3) DFG MAK TWA (SKIN);
- 2 PPM (10 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; METHANOL; GAS CHROMATOGRAPHY WITH FLAME
IONIZATION DETECTION; (NIOSH VOL. III # 2005).

10,000 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
1000 POUNDS SARA SECTION 304 REPORTABLE QUANTITY

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: COLORLESS OR PALE YELLOW TO BROWN OILY LIQUID WITH A STRONG ODOR
OF BITTER ALMONDS. BOILING POINT: 412 F (211 C)

MELTING POINT: 41 F (6 C) SPECIFIC GRAVITY: 1.2

VAPOR PRESSURE: 0.26 MMHG @ 20 C EVAPORATION RATE: 160 (ETHER = 1)

SOLUBILITY IN WATER: 0.2% @ 20 C ODOR THRESHOLD: 1.6 PPB-1.9 PPM

VAPOR DENSITY: 4.25

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, BENZENE, ETHER, GLACIAL ACETIC
ACID, OILS, ACETONE, AND MOST ORGANIC SOLVENTS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY
GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FLASH POINT: 190 F (88 C) (CC) UPPER EXPLOSIVE LIMIT: 40%

LOWER EXPLOSIVE LIMIT: 1.8% @ 93 C AUTOIGNITION TEMP.: 900 F (482 C)

FLAMMABILITY CLASS(OSHA): IIIA

FIREFIGHTING MEDIA:
DRY CHEMICAL, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
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 (1990 EMERGENCY RESPONSE

GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 55).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. EXTINGUISH USING AGENT INDICATED. USE FLOODING AMOUNTS OF WATER AS A FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING POISONOUS VAPORS, KEEP UPWIND. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

WATER MAY BE USED TO BLANKET FIRE (NFPA 325M FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1984)

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
POISON B

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
POISON

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.346
EXCEPTIONS: 49 CFR 173.345

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180)
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
NITROBENZENE-UN 1662

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
POISON

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

NITROBENZENE:

IRRITATION DATA: 500 MG/24 HOURS SKIN-RABBIT MILD; 500 MG/24 HOURS EYE-RABBIT MILD.

TOXICITY DATA: 2100 MG/KG SKIN-RAT LD50; 600 MG/KG SKIN-RABBIT LDLO; 25 GM/KG SKIN-CAT LDLO; 480 MG/KG SKIN-MOUSE LDLO; 780 MG/KG ORAL-RAT LD50; 590 MG/KG ORAL-MOUSE LD50; 700 MG/KG ORAL-RABBIT LDLO; 1 GM/KG ORAL-CAT LDLO; 750 MG/KG ORAL-DOG LDLO; 1000 MG/KG ORAL-MAMMAL LDLO; 200 MG/KG ORAL-WOMAN TDLO; 286 MG/KG SUBCUTANEOUS-MOUSE LDLO; 800 MG/KG SUBCUTANEOUS-RAT LDLO; 800 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 150 MG/KG INTRAVENOUS-DOG LDLO; 640 MG/KG INTRAPERITONEAL-RAT LD50; 500 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; 35 MG/KG UNREPORTED-MAN LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: IRRITANT- EYE.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION; SLIGHTLY TOXIC BY DERMAL ABSORPTION.

TARGET EFFECTS: METHEMOGLOBIN FORMER. POISONING MAY ALSO AFFECT THE LIVER.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH BLOOD AND LIVER DISORDERS.

ADDITIONAL DATA: MAY CROSS THE PLACENTA. ALCOHOL MAY ENHANCE THE TOXIC EFFECTS. SYNERGISM PRODUCING INCREASED LETHALITY HAS BEEN REPORTED WITH FORMALIN, BUTYL ETHER, ANILINE, DIOXANE, ACETONE, AND CARBON TETRACHLORIDE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

NITROBENZENE, LIQUID:

METHEMOGLOBIN FORMER.

200 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

SEE INFORMATION ON METHEMOGLOBIN FORMERS. IRRITATION MAY OCCUR. ADDITIONAL EFFECTS RELATED TO THE NERVOUS SYSTEM MAY INCLUDE DEPRESSION WHICH MAY BE PRECEDED BY STIMULATION, PARESTHESIAS, HYPERALGESIA, AND POLYNEURITIS.

SULFHEMOGLOBIN FORMATION MAY ALSO OCCUR. PATHOLOGIC FINDINGS IN HUMANS HAVE INCLUDED EDEMA, HEMORRHAGE AND SOFTENING OF THE BRAIN. CHRONIC EXPOSURE HAS PRODUCED LIVER DAMAGE IN HUMANS. IN ANIMALS, CHRONIC EXPOSURE HAS PRODUCED LESIONS OF THE BRAIN AND ADRENALS, AND DAMAGE TO THE LIVER, KIDNEYS, SPLEEN, AND TESTES.

METHEMOGLOBIN FORMER.

ACUTE EXPOSURE- AT ABOUT 15% CONCENTRATION OF METHEMOGLOBIN, OBSERVABLE CYANOSIS OF THE LIPS, NOSE AND EARLOBES MAY APPEAR. SYMPTOMS MAY BE ABSENT ALTHOUGH EUPHORIA, FLUSHED FACE AND HEADACHE ARE COMMON. AT 25-40%, CYANOSIS IS MARKED, BUT LITTLE DISABILITY OCCURS EXCEPT ON EXERTION. AT 40-60%, SYMPTOMS MAY INCLUDE WEAKNESS, DIZZINESS, LIGHTEADEDNESS, INCREASINGLY SEVERE HEADACHE, ATAXIA, RAPID, SHALLOW RESPIRATION, DROWSINESS, NAUSEA, VOMITING, CONFUSION, LETHARGY, AND STUPOR. ABOVE 60%, DYSPNEA, RESPIRATORY DEPRESSION, TACHYCARDIA OR BRADYCARDIA, CONVULSIONS, AND COMA MAY OCCUR. LEVELS ABOVE 70% MAY BE FATAL.

CHRONIC EXPOSURE- COMPOUNDS WITH CUMULATIVE PROPERTIES MAY PRODUCE A PERSISTENT, CHRONIC TYPE OF METHEMOGLOBINEMIA WHICH IS THE SAME AS THAT

PRODUCED BY SINGLE LARGE EXPOSURES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

NITROBENZENE, LIQUID:

IRRITANT/METHEMOGLOBIN FORMER.

ACUTE EXPOSURE- MAY CAUSE IRRITATION AND POSSIBLY BURNS. SENSITIZATION REACTIONS MAY OCCUR IN PREVIOUSLY EXPOSED PERSONS. RAPID SKIN ABSORPTION MAY OCCUR RESULTING IN EFFECTS AS IN INHALATION.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY CAUSE EFFECTS AS IN INHALATION.

FIRST AID- 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.

EYE CONTACT:

NITROBENZENE, LIQUID:

ACUTE EXPOSURE- MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

NITROBENZENE, LIQUID:

METHEMOGLOBIN FORMER.

ACUTE EXPOSURE- MAY CAUSE EFFECTS AS IN INHALATION. SINGLE DOSES HAVE CAUSED TESTICULAR DAMAGE AND DECREASED SPERM LEVELS IN ANIMALS.

CHRONIC EXPOSURE- REPEATED ADMINISTRATION MAY CAUSE EFFECTS AS IN INHALATION.

FIRST AID- IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC FOLLOWED BY WATER. (IF VOMITING OCCURS KEEP THE HEAD BELOW THE HIPS TO PREVENT ASPIRATION). REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. GIVE ACTIVATED CHARCOAL. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND

ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

METHEMOGLOBINEMIA:

(WHEN METHEMOGLOBIN CONCENTRATION IS OVER 25-40% OR IN PRESENCE OF SYMPTOMS.) GIVE METHYLENE BLUE, 1% SOLUTION, 0.1 ML/KG INTRAVENOUSLY OVER A 10-MINUTE PERIOD. CYANOSIS MAY DISAPPEAR WITHIN MINUTES OR PERSIST LONGER DEPENDING ON DEGREE OF METHEMOGLOBINEMIA. INTRAVENOUS ADMINISTRATION OF THERAPEUTIC DOSES OF METHYLENE BLUE MAY CAUSE A RISE IN BLOOD PRESSURE, NAUSEA, AND DIZZINESS. LARGER DOSES (>500 MG) CAUSE VOMITING, DIARRHEA, CHEST PAIN, MENTAL CONFUSION, CYANOSIS, AND SWEATING. HEMOLYTIC ANEMIA HAS ALSO OCCURRED SEVERAL DAYS AFTER ADMINISTRATION. THESE EFFECTS ARE TEMPORARY, AND FATALITIES HAVE NOT BEEN REPORTED. IF METHYLENE BLUE IS NOT AVAILABLE, GIVE ASCORBIC ACID, 1 GRAM SLOWLY INTRAVENOUSLY. WITHOUT TREATMENT, METHEMOGLOBINEMIA LEVELS OF 20-30% REVERT TO NORMAL WITHIN 3 DAYS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

NITROBENZENE:

ALKALIES: EXPLOSIVE REACTION.

ALUMINUM TRICHLORIDE: THERMALLY UNSTABLE AND MAY LEAD TO EXPLOSIVE DECOMPOSITION.

ALUMINUM TRICHLORIDE AND PHENOL MIXTURE: VIOLENT REACTION AT 120 C.

ANILINE, GLYCEROL AND FERROUS SULFATE (STIRRED MIXTURE) WITH ADDITION OF SULFURIC ACID: VIOLENT REACTION.

DINITROGEN TETROXIDE: EXPLOSIVE MIXTURE, HIGHLY SENSITIVE TO MECHANICAL STIMULI.

NITRIC ACID: FORMS DETONABLE MIXTURE.

PEROXODISULFURIC ACID: EXPLOSIVE REACTION.

PHOSPHORUS PENTACHLORIDE: BEGINS TO DECOMPOSE WITH ACCELERATING VIOLENCE ABOVE 120 C.

PLASTICS, RUBBER, COATINGS: ATTACKED.

POTASSIUM (TRACES): FORMS EXTREMELY SHOCK-SENSITIVE COMPOUNDS.

POTASSIUM-SODIUM ALLOY (TRACES): FORMS EXTREMELY SHOCK-SENSITIVE COMPOUNDS.

SILVER PERCHLORATE: FORMS EXPLOSIVE, SHOCK-SENSITIVE SOLVATED SALT.

SODIUM CHLORATE: POWERFUL EXPLOSIVE.

SULFURIC ACID: POSSIBLE EXPLOSION.

SULFURIC ACID AND SULFUR TRIOXIDE (OLEUM): VIOLENTLY EXOTHERMIC ABOVE 145 C.

TETRANITROMETHANE: SPARK-DETONATABLE HIGHLY SENSITIVE AND EXPLOSIVE MIXTURE.

TIN AND CAUSTICS: EXOTHERMIC REACTION WITH EVOLUTION OF FUMES.

URONIUM PERCHLORATE: FORMS POWERFUL EXPLOSIVES.

ZINC AND CAUSTICS: EXOTHERMIC REACTION WITH EVOLUTION OF FUMES.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON AND NITROGEN.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL

TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

THRESHOLD PLANNING QUANTITY (TPQ):
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

STORE IN A COOL, DRY, WELL-VENTILATED, DARK LOCATION. SEPARATE FROM ACIDS, BASES, OXIDIZING MATERIALS, AND METALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1991).

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER U169.

NITROBENZENE - REGULATORY LEVEL: 2.0 MG/L
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D036.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.
LIQUID NITROBENZENE WILL ATTACK SOME FORMS OF PLASTICS, RUBBER, AND COATINGS.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

AIR SPILL:
APPLY WATER SPRAY TO KNOCK DOWN VAPORS.

WATER SPILL:

USE NATURAL DEEP WATER POCKETS, EXCAVATED LAGOONS, OR SAND BAG BARRIERS TO TRAP MATERIAL AT BOTTOM. USE ACTIVATED CARBON AT 10 TIMES THE SPILLED AMOUNT IF IT IS DISSOLVED AT 10 PPM OR GREATER CONCENTRATION. REMOVE TRAPPED MATERIAL WITH SUCTION HOSES. USE MECHANICAL DREDGES OR LIFTS TO REMOVE IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINERS AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

NITROBENZENE:

10 PPM- CHEMICAL CARTRIDGE RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDGE.
SUPPLIED-AIR RESPIRATOR.
SELF-CONTAINED BREATHING APPARATUS.

25 PPM- SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS-FLOW MODE.
POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES.

50 PPM- CHEMICAL CARTRIDGE RESPIRATOR WITH FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE.
AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

200 PPM- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 09/25/84 REVISION DATE: 02/25/92

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PLUTONIUM-239 MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS19088

CAS#: 15117-48-3 FORMULA: PU

PLUTONIUM-239 IS A SILVER-WHITE SOLID.

EXPOSURE LIMITS:

SEE CODE OF FEDERAL REGULATIONS FOR OSHA STANDARDS CONCERNING EXPOSURE TO RADIOACTIVE SUBSTANCES.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE REDNESS AND SWELLING OF THE EYES, NAUSEA, VOMITING, DIARRHEA, TWITCHING, SEIZURES, INCOORDINATION, EFFECTS OF THE SKIN, BLOOD, BRAIN, STOMACH, AND INTESTINES, AND EYE, STOMACH, INTESTINE, AND SPLEEN DAMAGE. REPRODUCTIVE EFFECTS MAY OCCUR.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, LUNG DAMAGE AND CANCER MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT DANGEROUSLY WITH WATER WITH THE GENERATION OF MUCH HEAT. MAY REACT DANGEROUSLY WITH CARBON TETRACHLORIDE.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS19088
15117-48-3
PLUTONIUM-239

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OHS19088

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 15117-48-3

SUBSTANCE: PLUTONIUM-239

TRADE NAMES/SYNONYMS:

PLUTONIUM; PLUTONIUM, ISOTOPE OF MASS 239; PLUTONIUM METAL; PLUTONIUM 239;
STCC 4929140; UN 2918; PU-239; PU; OHS19088

CHEMICAL FAMILY:
METAL

RADIOACTIVE

MOLECULAR FORMULA: PU

MOLECULAR WEIGHT: 239.05

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=2 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: PLUTONIUM-239
CAS# 15117-48-3

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

OCCUPATIONAL EXPOSURE TO RADIOACTIVE SUBSTANCES MUST ADHERE TO STANDARDS
ESTABLISHED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION,
29 CFR 1910.96, AND/OR THE NUCLEAR REGULATORY COMMISSION, 10 CFR PART 20.

PHYSICAL DATA

DESCRIPTION: SILVER-WHITE CRYSTALLINE SOLID.

BOILING POINT: 5850 F (3232 C) (ALPHA FORM)

MELTING POINT: 1186 F (641 C) (ALPHA FORM)

SPECIFIC GRAVITY: 19.84 (ALPHA FORM) SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN HYDROCHLORIC ACID; INSOLUBLE IN NITRIC ACID, CONCENTRATED SULFURIC ACID.

SPECIFIC ACTIVITY: 0.062 CI/G

HALF LIFE: 24,411.0 YEARS

CRITICAL MASS: 10 LBS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY OR FOG (FLOODING AMOUNTS) (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT MOVE DAMAGED CONTAINERS; MOVE UNDAMAGED CONTAINERS OUT OF FIRE ZONE. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 63).

CONTACT THE LOCAL, STATE, OR DEPARTMENT OF ENERGY RADIOLOGICAL RESPONSE TEAM. EXTINGUISH FIRE USING AGENT SUITABLE FOR TYPE OF SURROUNDING FIRE. KEEP CONTAINERS COOL WITH FLOODING QUANTITIES OF WATER, APPLIED FROM AS FAR A DISTANCE AS POSSIBLE. AVOID CONTAMINATION OF WATER SOURCES AND SEWERS. AVOID BREATHING DUSTS AND FUMES OF BURNING MATERIAL. KEEP UNNECESSARY PEOPLE OUT OF INCIDENT AREA UNTIL AREA IS DECLARED SAFE BY RADIOLOGICAL RESPONSE TEAM.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
RADIOACTIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
RADIOACTIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.417
EXCEPTIONS: 49 CFR 173.453

TOXICITY

PLUTONIUM-239:

CARCINOGEN STATUS: NONE. HOWEVER, EXPOSURE TO IONIZING RADIATION MAY CAUSE

CANCER.

ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.

TARGET EFFECTS: PLUTONIUM IN THE BODY MOST OFTEN ACCUMULATES IN THE LUNGS, LYMPH NODES, LIVER AND SKELETON. HOWEVER, SIGNIFICANT QUANTITIES MAY ALSO BE FOUND IN THE SPLEEN, GONADS, AND THYROID. THE BIOLOGICAL HALF-LIVES HAVE BEEN REPORTED TO BE 40 YEARS IN THE LIVER AND 100 YEARS IN THE BONE. A RADIOACTIVE MATERIAL PRESENTS THE GREATEST HAZARD TO THOSE PARTS OF THE BODY IN WHICH IT IS MOST CONCENTRATED.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH CHRONIC OBSTRUCTIVE LUNG DISEASE OR IRON DEFICIENCY ANEMIA.

ADDITIONAL DATA: PLUTONIUM-239 IS AN EMITTER OF ALPHA PARTICLES AND SOME VERY SOFT GAMMA RAYS. EXPOSURE TO RADIOACTIVE PLUTONIUM MAY RESULT IN SIGNIFICANT WHOLE-BODY IRRADIATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:

PLUTONIUM-239:

ACUTE EXPOSURE- WHEN INHALED, PLUTONIUM IS RETAINED IN THE LUNG WITH AN EFFECTIVE HALF-LIFE THAT VARIES FROM HUNDREDS OF DAYS FOR PLUTONIUM OXIDES TO TENS OF DAYS FOR MORE SOLUBLE FORMS. PLUTONIUM SOLUBILIZED WITHIN THE LUNGS IS TRANSLOCATED TO THE LIVER AND SKELETON WHERE IT IS RETAINED. FOLLOWING AN INHALATION OF AN AEROSOL CONTAINING PLUTONIUM, THE PATTERN OF ITS DEPOSITION AND CLEARANCE FROM THE RESPIRATORY TRACT AND THE FRACTION ELIMINATED FROM THE BODY AS WELL AS THE FRACTION DEPOSITED IN THE TARGET ORGAN DEPENDS ON A VARIETY OF FACTORS, INCLUDING THE SIZE, SHAPE AND DENSITY OF THE PARTICLES INHALED AND THE CHEMICAL FORM. ANIMALS EXPOSED TO SINGLE HIGH DOSES OF PLUTONIUM 239 DIED FROM RADIATION PNEUMONITIS CHARACTERIZED BY EDEMA, FIBROSIS AND RESPIRATORY DAMAGE. DEATH OCCURRED IN 1-3 YEARS. THE LIVERS OF EXPOSED ANIMALS WERE CONGESTED, PIGMENTED AND GRANULAR.

CHRONIC EXPOSURE- NO CLINICAL ILLNESS HAS BEEN ATTRIBUTED TO LONG-TERM INTERNALLY DEPOSITED PLUTONIUM AS A RESULT OF OCCUPATIONAL EXPOSURE, AND A MORTALITY STUDY OF 224 PLUTONIUM WORKERS HAS SHOWN NO EXCESS DEATHS FROM ANY CAUSE. ONE STUDY WITH A SMALL NUMBER OF SUBJECTS SHOWED A STATISTICALLY SIGNIFICANT INCREASE IN MULTIPLE MYELOMAS. LONG TERM EXPOSURE OF DOGS TO PLUTONIUM OXIDE RESULTED IN RADIATION PNEUMONITIS, PULMONARY FIBROSIS, AND DEATH DUE TO PRIMARY NEOPLASIA.

SEE THE FOLLOWING SECTIONS REGARDING ADVERSE EFFECTS FROM EXPOSURE TO ALPHA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- ALPHA RADIATION IS DENSELY IONIZING WITH VERY HIGH ENERGY AND WILL KILL CELLS IMMEDIATELY ADJACENT TO THE SOURCE OF CONTACT. DAMAGED CELLS MAY NOT RECOVER OR BE REPAIRED. ALPHA EMITTERS MAY OR MAY NOT BE ABSORBED, DEPENDING ON THE SOLUBILITY AND PARTICLE SIZE. INSOLUBLE COMPOUNDS MAY REMAIN AT OR NEAR THE SITE OF DEPOSITION, AND SOLUBLE COMPOUNDS MAY RAPIDLY ENTER THE BLOODSTREAM. HEAVIER PARTICLES WILL BE BROUGHT UP TO THE THROAT BY CILIARY ACTION, AND MAY THEN BE SWALLOWED. THE LIGHTER PARTICLES MAY BE LODGED DEEP IN THE ALVEOLAR AIR SACS AND REMAIN. THE DAMAGE DEPENDS ON HOW QUICKLY THEY ARE ELIMINATED, AND THE SUSCEPTIBILITY OF THE TISSUE IN WHICH THEY ARE STORED. A SINGLE LARGE DOSE OF RADIATION MAY LEAD TO RADIATION SICKNESS.

CHRONIC EXPOSURE- THE EFFECTS OF CHRONIC EXPOSURE BY INTERNALLY DEPOSITED ALPHA RADIATION IS DEPENDENT UPON THE DOSE AND TARGET ORGAN(S). IF THE TOTAL DOSE IS SUFFICIENT, RADIATION SICKNESS MAY OCCUR. POSSIBLE DISORDERS INCLUDE LUNG CANCER, STERILITY, ANEMIA, LEUKEMIA, OR BONE CANCER.

RADIATION SICKNESS:

ACUTE EXPOSURE- WHOLE BODY DOSES OF 200-1000 RADS MAY CAUSE ANOREXIA, APATHY, NAUSEA AND VOMITING AND MAY BECOME MAXIMAL WITHIN 6-12 HOURS. AN ASYMPTOMATIC PERIOD OF 24-36 HOURS MAY BE FOLLOWED BY LYMPHOPENIA AND SLOWLY DEVELOPING NEUTROPENIA. THROMBOCYTOPENIA MAY BECOME PROMINENT WITHIN 3-4 WEEKS. THE LYMPH NODES, SPLEEN AND BONE MARROW MAY BEGIN TO ATROPHY. IF BONE MARROW DEPRESSION REACHES A CRITICAL LEVEL, DEATH MAY OCCUR FROM OVERWHELMING INFECTION. WHOLE BODY DOSES OF 400 OR MORE RADS MAY CAUSE INTRACTABLE NAUSEA, VOMITING AND DIARRHEA THAT MAY LEAD TO SEVERE DEHYDRATION, VASCULAR COLLAPSE AND DEATH. REGENERATION OF THE INTESTINAL EPITHELIUM MAY OCCUR, BUT MAY BE FOLLOWED BY HEMATOPOIETIC FAILURE WITHIN 2-3 WEEKS. WHOLE BODY DOSES OF 600 OR MORE RADS MAY BE FATAL DUE TO GASTROINTESTINAL OR HEMATOPOIETIC MALFUNCTION. WITH DOSES <600 RADS, THE POSSIBILITY OF SURVIVAL IS INVERSELY RELATED TO THE DOSE. WHOLE BODY DOSES >3000 RADS GENERALLY CAUSE NAUSEA, VOMITING, LISTLESSNESS, DROWSINESS RANGING FROM APATHY TO PROSTRATION, TREMORS, CONVULSIONS, ATAXIA AND DEATH WITHIN A FEW HOURS. THE GONADS ARE ALSO PARTICULARLY RADIOSENSITIVE. A SINGLE DOSE OF 30 RADS RESULTS IN TEMPORARY STERILITY AMONG MEN. IN WOMEN, LOSS OF FERTILITY MAY BE INDICATED BY LOSS OF MENSTRUATION.

CHRONIC EXPOSURE- THE DELAYED EFFECTS OF RADIATION MAY BE DUE EITHER TO A SINGLE LARGE OVEREXPOSURE OR CONTINUING LOW-LEVEL OVEREXPOSURE AND MAY INCLUDE CANCER, GENETIC EFFECTS, SHORTENING OF LIFE SPAN AND CATARACTS. CANCER IS OBSERVED MOST FREQUENTLY IN THE HEMATOPOIETIC SYSTEM, THYROID, BONE AND SKIN. LEUKEMIA IS AMONG THE MOST LIKELY FORMS OF MALIGNANCY. LUNG CANCER MAY ALSO OCCUR DUE TO RADIOACTIVE MATERIALS RESIDING IN THE LUNGS. GENETIC EFFECTS MAY RANGE FROM POINT MUTATIONS TO SEVERE CHROMOSOME DAMAGE SUCH AS STRAND BREAKAGE, TRANSLOCATIONS, AND DELETIONS. IF THE GERM CELLS HAVE BEEN AFFECTED, THE EFFECTS OF THE MUTATION MAY NOT BECOME APPARENT UNTIL THE NEXT GENERATION, OR EVEN LATER.

FIRST AID- REMOVE FROM EXPOSURE AREA TO A RESTRICTED AREA WITH FRESH AIR AS QUICKLY AS POSSIBLE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION BY ADMINISTERING OXYGEN; MOUTH-TO-MOUTH RESUSCITATION SHOULD BE AVOIDED TO PREVENT EXPOSURE TO THE PERSON RENDERING FIRST AID. ANY EVIDENCE OF SERIOUS CONTAMINATION INDICATES THAT TREATMENT MUST BE INSTITUTED. (INHALATION OF RADIOACTIVE PARTICLES MAY INDICATE THAT OTHER PARTS OF THE BODY WERE ALSO CONTAMINATED, SUCH AS THE DIGESTIVE TRACT, SKIN AND EYES.) IF TIME PERMITS, WIPE THE FACE WITH WET FILTER PAPER, FORCE COUGHING AND BLOWING OF THE NOSE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA #3, PG. 65)

!! WARNING!!

THE VICTIM MAY BE CONTAMINATED WITH RADIOACTIVE PARTICLES. THOROUGH DECONTAMINATION SHOULD BE STARTED BEFORE THE VICTIM IS MOVED TO THE MEDICAL AREA.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID MUST BE MONITORED FOR RADIOACTIVITY AND THOROUGHLY DECONTAMINATED IF NECESSARY (IAEA #3, PG.65).

SKIN CONTACT:

PLUTONIUM-239:

ACUTE EXPOSURE- PENETRATION THROUGH HEALTHY SKIN HAS NEVER BEEN REPORTED, HOWEVER CONTAMINATION MAY OCCUR THROUGH BROKEN SKIN.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

SEE THE FOLLOWING SECTIONS REGARDING ADVERSE EFFECTS FROM EXPOSURE TO ALPHA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- ALPHA RADIATION IS NOT USUALLY AN EXTERNAL HAZARD. HOWEVER, LOCAL DAMAGE MAY OCCUR AT THE SITE OF A WOUND. ABSORPTION OR PENETRATION THROUGH DAMAGED SKIN MAY RESULT IN RADIATION SICKNESS.
CHRONIC EXPOSURE- PROLONGED OR REPEATED CONTACT MAY RESULT IN RADIATION SICKNESS.

RADIATION SICKNESS:

THE CLINICAL COURSE OF RADIATION SICKNESS DEPENDS UPON THE DOSE, DOSE RATE, AREA OF THE BODY AFFECTED AND TIME AFTER EXPOSURE. EXTERNAL AND INTERNAL RADIOACTIVITY OF ANY TYPE MAY CAUSE RADIATION SICKNESS.
RADIATION SICKNESS HAS THREE (3) CLEARLY DEFINED SYNDROMES WHICH ARE DESCRIBED IN DETAIL IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A SUITABLE AREA FOR DECONTAMINATION AS QUICKLY AS POSSIBLE. REMOVE CLOTHING AND SHOES IMMEDIATELY. THOROUGHLY WASH THE VICTIM WITH SOAP AND WATER, PAYING PARTICULAR ATTENTION TO THE HEAD, FINGER NAILS AND PALMS OF THE HANDS. UPON COMPLETION OF WASHING, MONITOR THE VICTIM FOR RADIOACTIVITY. IT IS IMPERATIVE THAT THE SKIN SHOULD BE DECONTAMINATED AS QUICKLY AS POSSIBLE. MINUTE SKIN INJURIES GREATLY INCREASE THE DANGER OF ISOTOPE PENETRATION INTO THE VICTIM; SHAVING SHOULD NOT BE ATTEMPTED. IF WATER AND SOAP HAVE BEEN INADEQUATE IN REMOVING THE RADIOACTIVE COMPOUND, DECONTAMINATING COMPOUNDS CONSISTING OF SURFACTANTS AND ABSORBENT SUBSTANCES MAY BE EFFECTIVE. COMPLEXING REAGENTS MAY ALSO BE OF USE. THE USE OF ORGANIC SOLVENTS IS TO BE AVOIDED, AS THEY MAY INCREASE THE SOLUBILITY AND ABSORPTION OF THE RADIOACTIVE SUBSTANCE. SKIN CONTAMINATION WITH RADIATION MAY BE AN INDICATION THAT OTHER PARTS OF THE BODY HAVE BEEN EXPOSED (IAEA # 47, PG.9; IAEA #3, PG. 62).

!! WARNING!!

CONTAMINATED CLOTHING MUST BE STORED IN A METAL CONTAINER FOR LATER DECONTAMINATION OR DISPOSAL. THE WATER USED TO WASH THE VICTIM MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL.
ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PG.62).

EYE CONTACT:

PLUTONIUM-239:

ACUTE EXPOSURE- NO SPECIFIC DATA AVAILABLE.
CHRONIC EXPOSURE- NO SPECIFIC DATA AVAILABLE.

SEE THE FOLLOWING SECTIONS REGARDING ADVERSE EFFECTS FROM EXPOSURE TO ALPHA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- RADIATION AFFECTS THE EYE BY INDUCING ACUTE INFLAMMATION OF THE CONJUNCTIVA AND THE CORNEA. THE MOST SENSITIVE PART OF THE EYE IS THE CRYSTALLINE LENS. A LATE EFFECT OF EYE IRRADIATION IS CATARACT FORMATION. IT MAY BEGIN ANYWHERE FROM 6 MONTHS TO SEVERAL YEARS AFTER A SINGLE EXPOSURE. CATARACT FORMATION BEGINS AT THE POSTERIOR POLE OF THE LENS, AND CONTINUES UNTIL THE ENTIRE LENS HAS BEEN AFFECTED. GROWTH OF THE OPACITY MAY STOP AT ANY POINT. THE RATE OF GROWTH AND THE DEGREE OF OPACITY ARE DEPENDENT UPON THE DOSE OF RADIATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO ALPHA RADIATION MAY RESULT IN CATARACT FORMATION, AS DESCRIBED ABOVE. OF THE WELL-DOCUMENTED LATE EFFECTS OF RADIATION ON MAN, LEUKEMIA AND CATARACTS HAVE BEEN OBSERVED AT DOSES LOWER THAN THOSE PRODUCING SKIN SCARRING AND CANCER OR BONE TUMORS. THE LENS OF THE EYE SHOULD BE CONSIDERED TO BE A CRITICAL ORGAN.

RADIATION SICKNESS:

THE EYES ARE VERY RADIOSENSITIVE; A SINGLE DOSE OF 100 RADS MAY CAUSE CONJUNCTIVITIS AND KERATITIS.

IT IS UNLIKELY THAT A DOSE SUFFICIENT TO CAUSE RADIATION SICKNESS WOULD OCCUR IF ONLY THE EYES WERE IRRADIATED. HOWEVER, IF EYE DAMAGE BY IONIZING RADIATION OCCURS, IT MAY BE BEST TO ASSUME THAT OTHER PARTS OF THE BODY HAVE ALSO BEEN CONTAMINATED. SYMPTOMS OF RADIATION SICKNESS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A RESTRICTED AREA FOR DECONTAMINATION.

THOROUGHLY WASH EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE THE UPPER AND LOWER LIDS (APPROXIMATELY 15 MINUTES). FOLLOWING THE WATER TREATMENT, PROVIDE AN ISOTONIC SOLUTION. DO NOT USE EYEBATHS, RATHER PROVIDE A CONTINUOUS AND COPIOUS SUPPLY OF FLUID. MONITOR THE VICTIM FOR RADIOACTIVITY. IF ACTIVITY IS PRESENT, REWASH THE EYES, AND REMONITOR UNTIL LITTLE OR NO RADIOACTIVITY IS PRESENT. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 3, PG. 65; IAEA # 47, PG. 35).

!! WARNING!!

ANY WATER USED TO WASH THE VICTIMS EYES MUST BE STORED IN A METAL CONTAINER FOR LATER DISPOSAL. ANY OTHER ARTICLES THAT ARE USED TO DECONTAMINATE THE VICTIM MUST ALSO BE STORED IN METAL CONTAINERS FOR LATER DECONTAMINATION OR DISPOSAL.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #3, PG.65; IAEA # 47, PG. 35).

INGESTION:

PLUTONIUM-239:

ACUTE EXPOSURE- INTESTINAL ABSORPTION IS VIRTUALLY ZERO; 0.003% FOR SOLUBLE COMPOUNDS AND 0.0001% FOR INSOLUBLE COMPOUNDS.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

SEE THE FOLLOWING SECTIONS REGARDING ADVERSE EFFECTS FROM EXPOSURE TO ALPHA RADIATION.

ALPHA RADIATION:

ACUTE EXPOSURE- THE FATE OF INGESTED ALPHA EMITTERS DEPENDS ON THEIR SOLUBILITY AND VALENCE. HIGH DOSES MAY LEAD TO RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

CHRONIC EXPOSURE- REPEATED INGESTION OF ALPHA EMITTERS MAY LEAD TO RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

RADIATION SICKNESS:

THE SYMPTOMS OF RADIATION SICKNESS DEPENDS UPON THE DOSE RECEIVED. IT MAY RESULT FROM ACUTE OR CHRONIC EXPOSURE TO ANY FORM OF RADIATION. THE SYMPTOMS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID: IN THE CASE OF INGESTION OF RADIOACTIVE SUBSTANCES, THE MOUTH SHOULD BE RINSED OUT IMMEDIATELY AFTER THE ACCIDENT, CARE BEING TAKEN NOT TO SWALLOW THE WATER USED FOR THIS PURPOSE. VOMITING SHOULD BE INDUCED EITHER MECHANICALLY, OR WITH SYRUP OF IPECAC. DO NOT INDUCE VOMITING IN AN UNCONSCIOUS PERSON. LAVAGE MAY BE USEFUL. CARE SHOULD BE TAKEN TO AVOID ASPIRATION. THE VOMITUS AND LAVAGE FLUIDS SHOULD BE SAVED FOR EXAMINATION AND MONITORING. FURTHER ACTION DEPENDS ON THE NATURE OF THE RADIOACTIVE SUBSTANCE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 47, PG.9; IAEA #47, PG.9; IAEA # 3, PP. 59,66).

!!WARNING!!

THE GASTRIC FLUIDS AND FLUIDS USED FOR LAVAGE MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL. THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED, IF NECESSARY, BEFORE BEING TRANSPORTED TO A MEDICAL FACILITY.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PP. 59,66).

ANTIDOTE:

FOR PLUTONIUM POISONING:

GIVE 0.5 GRAM OF THE CALCIUM SALT OF DIETHYLENETRIAMINEPENTAACETIC ACID (DTPA) DILUTED IN 250 ML OF PHYSIOLOGICAL SALINE GIVEN BY SLOW INTRAVENOUS INJECTION. (IAEA SAFETY SERIES #47).

FOR INHALATION CONTAMINATION:

PREPARE AN CA-DTPA AEROSOL IMMEDIATELY USING A CA-DTPA AMPULE IN A CONVENTIONAL GENERATOR OR, PREFERABLY, A CAPSULE OF MICRONIZED CA-DTPA IN A GENERATOR PRODUCING AN AEROSOL OF SUITABLE PARTICLE SIZE, AND ALWAYS INJECT 0.5 G OF CA-DTPA INTRAVENOUSLY; PULMONARY LAVAGE SHOULD BE CONSIDERED BY QUALIFIED MEDICAL PERSONNEL. (IAEA SAFETY SERIES #47).

FOR CONTAMINATED WOUND:

INJECT CA-DTPA INTRAVENOUSLY AND WASH THE WOUND LOCALLY WITH A CONCENTRATED CA-DTPA SOLUTION ONE AMPULE); POSSIBLE SURGICAL REMOVAL OF THE PLUTONIUM IN THE WOUND SHOULD ONLY BE CONSIDERED BY QUALIFIED MEDICAL PERSONNEL. (IAEA SAFETY SERIES #47).

REACTIVITY

REACTIVITY:

MAY FORM PYROPHORIC PRODUCTS ON EXPOSURE TO AIR AND MOISTURE WHICH MAY PRESENT A FIRE HAZARD WITH SUBSEQUENT SPREAD OF RADIOACTIVE MATERIAL.

INCOMPATIBILITIES:

PLUTONIUM:

CARBON TETRACHLORIDE: MAY IGNITE OR EXPLODE.

DECOMPOSITION:

PLUTONIUM-239 DECAYS TO RADIOACTIVE URANIUM-235 WITH A HALF-LIFE OF 24,000 YEARS.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 10 CFR 20.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH 10 CFR 20 AND 60.

CONDITIONS TO AVOID

RADIATION HAZARD, DO NOT ALLOW MATERIAL TO SPREAD OR CONTAMINATE WATER SOURCES.

CARE MUST BE TAKEN IN THE HANDLING OF PLUTONIUM TO AVOID UNINTENTIONAL FORMATION OF A CRITICAL MASS. PLUTONIUM IN LIQUID SOLUTIONS IS MORE APT TO BECOME CRITICAL THAN SOLID PLUTONIUM.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

DO NOT TOUCH DAMAGED CONTAINERS OR SPILLED MATERIAL. DAMAGE TO OUTER CONTAINER MAY NOT AFFECT PRIMARY INNER CONTAINER. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGE SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AT LEAST 150 FEET UPWIND; GREATER DISTANCES MAY BE NECESSARY IF ADVISED BY QUALIFIED RADIATION AUTHORITY. ISOLATE HAZARD AREA AND DENY ENTRY. ENTER SPILL AREA

ONLY TO SAVE LIFE; LIMIT ENTRY TO SHORTEST POSSIBLE TIME. DETAIN UNINJURED PERSONS AND EQUIPMENT EXPOSED TO RADIOACTIVE MATERIAL UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY. DELAY CLEANUP UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

ONE METHOD OF CONTROLLING EXTERNAL RADIATION EXPOSURE IS TO PROVIDE ADEQUATE SHIELDING. THE ABSORBING MATERIAL USED AND THE THICKNESS REQUIRED TO ATTENUATE THE RADIATION TO ACCEPTABLE LEVELS DEPENDS ON THE TYPE OF RADIATION, ITS ENERGY, THE FLUX AND THE DIMENSIONS OF THE SOURCE.

ALPHA PARTICLES- FOR THE ENERGY RANGE OF ALPHA PARTICLES USUALLY ENCOUNTERED, A FRACTION OF A MILLIMETER OF ANY ORDINARY MATERIAL IS SUFFICIENT FOR ABSORBANCE. THIN RUBBER, ACRYLIC, STOUT PAPER, OR CARDBOARD WILL SUFFICE.

BETA PARTICLES- BETA PARTICLES ARE MORE PENETRATING THAN ALPHA, AND REQUIRE MORE SHEILDING. MATERIALS COMPOSED MOSTLY OF ELEMENTS OF LOW ATOMIC NUMBER SUCH AS ACRYLIC, ALUMINUM AND THICK RUBBER ARE MOST APPROPRIATE FOR THE ABSORPTION OF BETA PARTICLES. FOR EXAMPLE, 1/4 INCH OF ACRYLIC WILL ABSORB ALL BETA PARTICLES UP TO 1 MEV. WITH HIGH ENERGY BETA RADIATION FROM LARGE SOURCES, BREMSSTRAHLUNG (X RAY PRODUCTION) CONTRIBUTION MAY BECOME SIGNIFICANT AND IT MAY BE NECESSARY TO PROVIDE ADDITIONAL SHEILDING OF HIGH ATOMIC WEIGHT MATERIAL, SUCH AS LEAD, TO ATTENUATE THE BREMSSTRAHLUNG RADIATION.

GAMMA RAYS- THE MOST SUITABLE MATERIALS FOR SHIELDING GAMMA RADIATION ARE LEAD AND IRON. THE THICKNESS REQUIRED WILL DEPEND ON WHETHER THE SOURCE IS PRODUCING NARROW OR BROAD BEAM RADIATION. PRIMARY AND SECONDARY PROTECTIVE BARRIERS MAY BE REQUIRED TO BLOCK ALL RADIATION.

RESPIRATOR:

THESE RECOMMENDED RESPIRATORS SHOULD PROVIDE PROTECTION FOR THE RESPIRATORY TRACT AGAINST MOST OF THE RADIOACTIVE PARTICLES ENCOUNTERED IN THE WORK PLACE. THESE RESPIRATORS WILL NOT OFFER PROTECTION AGAINST BETA AND GAMMA RADIATION, BUT MAY BLOCK ALPHA PARTICLES. FROM 10CFR20.103 APPENDIX A. RESPIRATORY EQUIPMENT MUST BE CERTIFIED BY NIOSH/MSHA.

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.

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH 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.

CLOTHING:

DIPOSABLE OVERGARMENTS, INCLUDING HEAD COVERINGS AND FOOT COVERING, SHOULD BE WORN BY ANY EMPLOYEE ENGAGED IN HANDLING ANY RADIOACTIVE SUBSTANCE. THESE GARMENTS ARE ALSO RECOMMENDED EVEN IF THE EMPLOYEE IS WORKING WITH A "GLOVE BOX" CONTAINMENT SYSTEM. CERTAIN CLOTHING FIBERS MAY BE USEFUL IN DOSIMETRY SO CLOTHING SHOULD BE KEPT.

IN THE EVENT OF AN ACCIDENT, LARGE SCALE RELEASE OR A LARGE SCALE CLEAN-UP FULL PROTECTIVE CLOTHING WILL BE NECESSARY.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

WARNING!

USED GLOVES MAY PRESENT A RADIATION HAZARD AND SHOULD BE DISPOSED OF AS RADIOACTIVE WASTE.

EYE PROTECTION:

EMPLOYEE MUST WEAR APPROPRIATE EYE PROTECTION THAT WILL NOT ALLOW THE INTRODUCTION OF PARTICLES INTO THE EYES. CONTACT LENSES SHOULD NOT BE WORN.

CLOTHING, GLOVE, AND EYE PROTECTION EQUIPMENT WILL PROVIDE PROTECTION AGAINST ALPHA PARTICLES, AND SOME PROTECTION AGAINST BETA PARTICLES, DEPENDING ON THICKNESS, BUT WILL NOT SHIELD GAMMA RADIATION.

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CREATION DATE: 03/09/89 REVISION DATE: 09/27/91

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POTASSIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS19180

CAS#: 7440-09-7 FORMULA: K

POTASSIUM IS AN ODORLESS, SILVERY-WHITE METAL.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, SKIN, EYES, AND STOMACH; POSSIBLY DEEP. BLINDNESS AND EYE DAMAGE MAY OCCUR. ADDITIONAL EFFECTS MAY INCLUDE DIZZINESS, FEVER, LOW BLOOD PRESSURE, WEAK AND RAPID PULSE, DROOLING, FOAMING AT THE MOUTH, CHEST PAIN, LUNG CONGESTION, DIFFICULTY OR INABILITY TO SWALLOW OR SPEAK, DIARRHEA, VOMITING BLOOD, COLDNESS, FAINTING, SUFFOCATION WITH BLUISH COLOR OF THE SKIN, LIPS, AND

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OHS19180

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-09-7
RTECS NUMBER: TS6460000

SUBSTANCE: POTASSIUM

TRADE NAMES/SYNONYMS:

KALIUM; POTASSIUM METAL; POTASH; STCC 4916445; UN 2257; K; OHS19180

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: K

MOLECULAR WEIGHT: 39.098

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=2 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=1 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: POTASSIUM
CAS# 7440-09-7

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: ODORLESS, SOFT, SILVERY-WHITE METAL.

BOILING POINT: 1400 F (760 C) MELTING POINT: 145 F (63 C)

SPECIFIC GRAVITY: 0.86 VAPOR PRESSURE: 99.75 MMHG @ 171 C

SOLUBILITY IN WATER: REACTS

SOLVENT SOLUBILITY: SOLUBLE IN LIQUID AMMONIA, ETHYLENE DIAMINE, ANILINE,
SODIUM.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FINELY DIVIDED MATERIAL MAY IGNITE ON EXPOSURE TO AIR.

FIREFIGHTING MEDIA:
DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT
WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

USE RECOMMENDED AGENTS TO EXTINGUISH FIRE. DO NOT USE WATER OR CARBON DIOXIDE.
AVOID CONTAMINATION OF WATER SOURCES AND SEWERS. KEEP MATERIAL DRY. DO NOT
ATTEMPT TO SWEEP UP DRY MATERIAL. DO NOT BREATHE HAZARDOUS FUMES.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.206
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
POTASSIUM-UN 2257

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
DANGEROUS WHEN WET

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.244

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 50 KG

TOXICITY

POTASSIUM:
TOXICITY DATA: 700 MG/KG INTRAPERITONEAL-MOUSE LD50.
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE-INHALATION, SKIN, EYE, INGESTION.
ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.
TARGET EFFECTS: NO DATA AVAILABLE.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING KIDNEY DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
POTASSIUM:
CORROSIVE.
MAY REACT WITH MOISTURE TO FORM POTASSIUM HYDROXIDE, AN ALKALINE CORROSIVE.

ALKALINE CORROSIVES:
ACUTE EXPOSURE- MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT WITH COUGHING, CHOKING, PAIN AND POSSIBLY BURNS OF THE MUCOUS MEMBRANES. IN SOME CASES, PULMONARY EDEMA MAY DEVELOP, EITHER IMMEDIATELY IN SEVERE CASES OR MORE OFTEN WITH A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE TIGHTNESS IN THE CHEST, DYSPNEA, FROTHY SPUTUM, CYANOSIS, AND DIZZINESS. PHYSICAL FINDINGS MAY INCLUDE HYPOTENSION, WEAK AND RAPID PULSE AND MOIST RALES. SEVERE CASES MAY BE FATAL.
CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED EXPOSURE MAY CAUSE INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH AND POSSIBLY BRONCHIAL AND GASTROINTESTINAL DISTURBANCES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

POTASSIUM:

CORROSIVE.

MAY REACT WITH MOISTURE TO FORM POTASSIUM HYDROXIDE, AN ALKALINE CORROSIVE.
SEE INFORMATION ON ALKALINE CORROSIVES.

ALKALINE CORROSIVES:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE PAIN, BURNS AND POSSIBLY BROWNISH STAINS. THE CORRODED AREAS MAY BE SOFT, GELATINOUS AND NECROTIC AND THE TISSUE DESTRUCTION MAY BE DEEP.

CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT MAY CAUSE DERMATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

POTASSIUM:

CORROSIVE.

MAY REACT WITH MOISTURE TO FORM POTASSIUM HYDROXIDE, AN ALKALINE CORROSIVE.
SEE INFORMATION ON ALKALINE CORROSIVES.

ALKALINE CORROSIVES:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE PAIN AND BURNS. THERE MAY BE EDEMA, DESTRUCTION OF EPITHELIUM, CORNEAL OPACIFICATION AND IRITIS. WHEN DAMAGE IS LESS THAN EXCESSIVE, THESE SYMPTOMS TEND TO AMELIORATE. IN SEVERE BURNS, THE FULL EXTENT OF THE INJURY MAY NOT BE IMMEDIATELY APPARENT. LATE COMPLICATIONS MAY INCLUDE PERSISTENT EDEMA, VASCULARIZATION AND SCARRING OF THE CORNEA, PERMANENT OPACITY, STAPHYLOMA, CATARACT, SYMBLEPHARON AND BLINDNESS.

CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT MAY RESULT IN CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER. OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

POTASSIUM:

CORROSIVE.

MAY REACT WITH MOISTURE TO FORM POTASSIUM HYDROXIDE, AN ALKALINE CORROSIVE.
SEE INFORMATION ON ALKALINE CORROSIVES. IN PERSONS WITH RENAL DISORDERS, SUFFICIENT AMOUNTS MAY BE ABSORBED AND CAUSE HYPERKALEMIA, RESULTING IN CARDIOTOXICITY. SYMPTOMS MAY INCLUDE WEAKNESS OF MUSCLES, INCLUDING THOSE INVOLVED IN RESPIRATION, APPREHENSION, OR ANESTHESIA.

ALKALINE CORROSIVES:

ACUTE EXPOSURE- MAY CAUSE IMMEDIATE PAIN, CIRCUMORAL BURNS AND CORROSION OF THE MUCOUS MEMBRANES WHICH AT FIRST TURN WHITE AND SOAPY AND THEN BECOME BROWN, EDEMATOUS AND ULCERATED. THERE MAY BE PROFUSE SALIVATION AND DIFFICULTY OR INABILITY TO SWALLOW OR SPEAK. EVEN WHEN THERE IS NO EVIDENCE OF ORAL BURNS, THE ESOPHAGUS AND STOMACH MAY BE INVOLVED WITH BURNING PAIN, VOMITING AND DIARRHEA. THE VOMITUS MAY BE THICK AND SLIMY WITH MUCOUS, AND LATER CONTAIN BLOOD AND SHREDS OF MUCOSA. EPIGLOTTAL EDEMA MAY RESULT IN RESPIRATORY DISTRESS AND POSSIBLY ASPHYXIA. SHOCK WITH MARKED HYPOTENSION, WEAK AND RAPID PULSE, SHALLOW RESPIRATION, AND CLAMMY SKIN MAY OCCUR. CIRCULATORY COLLAPSE MAY ENSUE, AND IF UNCORRECTED, LEAD TO RENAL FAILURE. IN SEVERE CASES, ESOPHAGEAL OR GASTRIC PERFORATION ARE POSSIBLE AND MAY BE ACCOMPANIED BY MEDIASTITIS, SUBSTERNAL PAIN, PERITONITIS, ABDOMINAL RIGIDITY, AND FEVER. ESOPHAGEAL, AND POSSIBLY GASTRIC OR PYLORIC STRICTURE, MAY OCCUR WITHIN A FEW WEEKS, BUT MAY BE DELAYED FOR MONTHS OR EVEN YEARS. DEATH MAY RESULT WITHIN A SHORT TIME FROM ASPHYXIA, CIRCULATORY COLLAPSE, OR ASPIRATION OF EVEN MINUTE AMOUNTS. IF DEATH IS DELAYED IT MAY BE DUE TO THE COMPLICATIONS OF PERFORATION, PNEUMONIA, OR THE EFFECTS OF STRICTURE FORMATION.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION MAY RESULT IN INFLAMMATORY AND ULCERATIVE EFFECTS ON THE ORAL MUCOUS MEMBRANES AND OTHER EFFECTS AS WITH ACUTE INGESTION.

FIRST AID- DILUTE THE ALKALI BY GIVING WATER OR MILK IMMEDIATELY AND ALLOW VOMITING TO OCCUR. AVOID GASTRIC LAVAGE OR EMETICS. ESOPHAGOSCOPY IS THE ONLY WAY TO EXCLUDE THE POSSIBILITY OF CORROSION IN THE UPPER GASTROINTESTINAL TRACT; IF CORROSION IS SUSPECTED, ESOPHAGOSCOPY SHOULD USUALLY BE PERFORMED WITHIN 24 HOURS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). MAINTAIN AIRWAY AND TREAT SHOCK. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

REACTS VIOLENTLY WITH WATER EVOLVING HYDROGEN WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION. MAY IGNITE SPONTANEOUSLY IN MOIST AIR. MATERIAL MAY FORM A PEROXIDE COATING ON PROLONGED STORAGE, WHICH WILL PRESENT AN EXPLOSION HAZARD.

INCOMPATIBILITIES:**POTASSIUM:**

ACETYLENE: IGNITION, AND POSSIBLE EXPLOSION.

ACIDS: REACTS VIGOROUSLY.

ALCOHOLS: MAY EXPLODE IN THE PRESENCE OF AIR.

AMMONIUM SALTS: EXPLODE ON CONTACT.

BORIC ACID: VIOLENT OR EXPLOSIVE REACTION.

CARBON: VIGOROUS EXOTHERMIC REACTION AND POSSIBLE EXPLOSION.

COPPER OXYCHLORIDE: MAY EXPLODE ON IMPACT.

DICHLORINE OXIDE: EXPLODES ON CONTACT.

ETHYLENE OXIDE: POSSIBLE EXPLOSIVE POLYMERIZATION REACTION.

HALOCARBONS: FORM SHOCK-SENSITIVE MIXTURE.
 HALOGENS: IGNITION OR EXPLOSIVE REACTION.
 HYDRAZINE: EXPLOSIVE REACTION.
 HYDROGEN HALIDES: POSSIBLE IGNITION OR FORMATION OF SHOCK-SENSITIVE MIXTURE.
 HYDROGEN PEROXIDE: VIOLENT REACTION.
 INTERHALOGENS: IGNITION OR EXPLOSIVE REACTION.
 LEAD OXYCHLORIDE: FORMS IMPACT-SENSITIVE MIXTURE.
 LEAD PEROXIDE: EXPLOSIVE REACTION.
 LEAD SULFATE: VIOLENT OR EXPLOSIVE REACTION.
 MALEIC ANHYDRIDE: EXOTHERMIC DECOMPOSITION REACTION.
 MERCURY: POSSIBLE VIOLENT REACTION.
 METAL HALIDES: FORM SHOCK-SENSITIVE MIXTURE.
 METAL OXIDES: MAY IGNITE OR EXPLODE.
 NITRIC ACID: EXPLOSIVE REACTION.
 NITROGEN-CONTAINING EXPLOSIVES: INCREASED SHOCK-SENSITIVITY.
 NITRYL FLUORIDE: INCANDESCENT REACTION.
 NON-METAL HALIDES: MAY IGNITE OR EXPLODE ON CONTACT.
 NON-METAL OXIDES: IGNITION OR FORMATION OF EXPLOSIVE MIXTURE.
 ORGANOSULFUR COMPOUNDS: FORMS IMPACT-SENSITIVE MIXTURE.
 OXALYL DIHALIDES: FORMS SHOCK-SENSITIVE MIXTURE.
 OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
 SELENIUM: EXOTHERMIC REACTION OR SLIGHT EXPLOSION.
 SELENIUM OXYCHLORIDE: EXPLOSION.
 SILVER IODATE: VIOLENT OR EXPLOSIVE REACTION.
 SODIUM IODATE: VIOLENT OR EXPLOSION REACTION.
 SODIUM NITRITE + AMMONIA: FORMS EXPLOSIVE DISODIUM NITRITE.
 SODIUM PEROXIDE: INCANDESCENT REACTION.
 SULFUR: VIOLENT REACTION WHEN WARMED.
 SULFURIC ACID: EXPLOSIVE REACTION.
 TELLURIUM: INCANDESCES WHEN WARMED UNDER HYDROGEN.
 THIOPHOSPHORYL FLUORIDE: IGNITION.
 VANADIUM OXYCHLORIDE: FORMS IMPACT-SENSITIVE MIXTURE.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

PROTECT AGAINST PHYSICAL DAMAGE. KEEP AWAY FROM WATER OR LOCATIONS WHERE WATER MAY BE NEEDED FOR FIGHTING FIRES IN OTHER STORAGE OR OTHER BUILDINGS. AVOID HIGH TEMPERATURES. STORE UNDER NITROGEN OR KEROSENE. NEVER STORE UNDER HALOGENATED HYDROCARBONS. A DETACHED FIRE-RESISTIVE BUILDING RECOMMENDED FOR

QUANTITY STORAGE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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RUTHENIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS20265

CAS#: 7440-18-8 FORMULA: RU

RUTHENIUM IS A GRAY-WHITE OR SILVER METAL.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE LUNG EFFECTS.

LONG TERM EXPOSURE: NO INFORMATION AVAILABLE.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SPILL OR LEAK:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL SPILLS, WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, WET DOWN WITH WATER AND DIKE FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS20265
7440-18-8
RUTHENIUM

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OHS20265

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
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1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: RUTHENIUM

CAS NUMBER: 7440-18-8

TRADE NAMES/SYNONYMS:

RU-A1; RUTHENIUM BLACK; RUTHENIUM ELEMENT; RU; OHS20265

CHEMICAL FAMILY:

METAL

MOLECULAR FORMULA: RU

MOLECULAR WEIGHT: 101.07

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=0 PERSISTENCE=3

NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: RUTHENIUM
CAS# 7440-18-8

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: GRAY-WHITE OR SILVER BRITTLE METAL.

BOILING POINT: 7052 F (3900 C) MELTING POINT: 4190 F (2310 C)

SPECIFIC GRAVITY: 12.30 VAPOR PRESSURE: 0.0098 MMHG @ 2310C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN FUSED ALKALI, ALKALINE HYDROXIDES; INSOLUBLE
IN AQUA REGIA, ALCOHOL, ACIDS.

HARDNESS (BRINELL'S): 220

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

RUTHENIUM:

CARCINOGEN STATUS: NONE.

ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.

TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

RUTHENIUM:

ACUTE EXPOSURE- INHALATION OF FUMES FROM HEATED RUTHENIUM MAY CAUSE IRRITATION AND INJURY TO THE LUNGS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

RUTHENIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

RUTHENIUM:

ACUTE EXPOSURE- CONTACT WITH FUMES FROM HEATED RUTHENIUM MAY CAUSE IRRITATION AND INJURY TO THE EYES.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

RUTHENIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

RUTHENIUM:

AQUA REGIA + POTASSIUM CHLORATE: EXPLOSIVE OXIDATION REACTION.
BROMINE: ATTACKED BETWEEN 300-700 C.
CHLORINE: ATTACKED ABOVE 200 C.
OXYGEN DIFLUORIDE: INCANDESCENT REACTION WHEN WARMED.
RUTHENIUM OXIDE: POSSIBLE VIOLENT REACTION.

DECOMPOSITION:

THEMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF RUTHENIUM.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 03/08/90 REVISION DATE: 02/21/91

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SELENIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS20500

CAS#: 7782-49-2 FORMULA: SE

SELENIUM IS AN ODORLESS, BLUISH-GRAY, BLACK OR RED SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. IN CASE OF A SURROUNDING FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST OR FUMES OF SELENIUM MAY CAUSE IRRITATION OF THE NOSE, THROAT, EYES, SKIN, AND STOMACH. ADDITIONAL EFFECTS MAY INCLUDE SNEEZING, COUGHING, METALLIC TASTE, NOSEBLEED, HEADACHE, LUNG CONGESTION, DIFFICULTY BREATHING, CHILLS, AND FEVER.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, AND KIDNEY DAMAGE MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS20500

7782-49-2

SELENIUM

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OHS20500

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7782-49-2
RTECS NUMBER: VS7700000

SUBSTANCE: SELENIUM

TRADE NAMES/SYNONYMS:

SELENIUM ELEMENT; C.I. 77805; SELENIUM, METALLIC; SELENIUM METAL;
SELENIUM, ELEMENTAL; UN 2658; SE; OHS20500

CHEMICAL FAMILY:
NON-METALLIC ELEMENT

MOLECULAR FORMULA: SE

MOLECULAR WEIGHT: 78.96

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: SELENIUM
CAS# 7782-49-2

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

SELENIUM AND COMPOUNDS (AS SE):

0.2 MG/M3 OSHA TWA
0.2 MG/M3 ACGIH TWA
0.2 MG/M3 NIOSH RECOMMENDED TWA
0.1 MG/M3 DFG MAK TWA (TOTAL DUST);
1 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. II(7) #.S190).

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

SELENIUM:

100 LBS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: ODORLESS, BLUISH-GRAY, BLACK OR RED SOLID.

BOILING POINT: 1261-1265 F (683-685 C) MELTING POINT: 423 F (217 C)

SPECIFIC GRAVITY: 4.81 VAPOR PRESSURE: 10 MMHG @ 429 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN SULFURIC ACID, CHLOROFORM, METHYLENE IODIDE, BENZENE, QUINOLINE, NITRIC ACID, ETHER, AQUEOUS ALKALINE SOLUTIONS, SELENIUM OXYCHLORIDE; VERY SLIGHTLY SOLUBLE IN CARBON DISULFIDE; INSOLUBLE IN ALCOHOL.

VISCOSITY: 221 CPS @ 220 C

MOHS' HARDNESS: 2.0

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 53).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. EXTINGUISH USING AGENT INDICATED.
USE FLOODING AMOUNTS OF WATER AS A FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING POISONOUS VAPORS, KEEP UPWIND. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

TRANSPORTATION DATA

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180), DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204. EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
SELENIUM POWDER-UN 2658

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
KEEP AWAY FROM FOOD

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.153
NON-BULK PACKAGING: 49 CFR 173.213
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 100 KG
CARGO AIRCRAFT ONLY: 200 KG

TOXICITY

SELENIUM:

TOXICITY DATA: 33 MG/KG/8 HOURS INHALATION-RAT LDLO; 6700 MG/KG ORAL-RAT LD50; 6 MG/KG INTRAVENOUS-RAT LD50; 2500 UG/KG INTRAVENOUS-RABBIT LDLO; REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL INADEQUATE EVIDENCE (IARC GROUP-3).

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.

ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INGESTION.

TARGET EFFECTS: NO DATA AVAILABLE.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH A HISTORY OF CHRONIC RESPIRATORY DISEASE, GASTROINTESTINAL DISTURBANCES, ALLERGIES, LIVER OR KIDNEY DISEASE, OR RECURRENT DERMATITIS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

SELENIUM:

IRRITANT. 100 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION MAY CAUSE IRRITATION OF THE UPPER RESPIRATORY TRACT WITH SNEEZING AND COUGHING. DUST OF METALLIC SELENIUM MAY COLLECT IN THE NOSTRILS AND PRODUCE CATARRH, ANOSMIA, AND EPISTAXIS. EXPOSURE TO SELENIUM DUST AT AIR CONCENTRATIONS OF 33 MG/M3 FOR 8 HOURS RESULTED IN DEATH IN 10% OF THE RATS TESTED. THE MAJOR PATHOLOGIC FINDING WAS INTERSTITIAL PNEUMONITIS. A BRIEF EXPOSURE TO HIGH CONCENTRATIONS OF FUME PRODUCED SEVERE IRRITATION OF THE NOSE AND THROAT FOLLOWED BY HEADACHE IN EXPOSED WORKERS. ONE CASE OF TRANSIENT DYSPNEA WAS REPORTED. LARGE QUANTITIES OF FUME MAY PRODUCE PULMONARY EDEMA WITHIN

1 TO 4 HOURS AFTER EXPOSURE. METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED METAL OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST, AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS. CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE HAS BEEN REPORTED TO CAUSE A METALLIC TASTE IN THE MOUTH, A GARLIC ODOR OF THE BREATH AND SWEAT, BRONCHIAL AND NASOPHARYNGEAL IRRITATION, PALLOR, COATED TONGUE, NERVOUSNESS, DEPRESSION, FATIGUE, VESTIBULOTOXICITY AND GASTROINTESTINAL DISTURBANCES. LIVER INJURY HAS BEEN PRODUCED IN EXPERIMENTAL ANIMALS. SELENIUM COMPOUNDS MAY AFFECT THE KIDNEYS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
SELENIUM:
IRRITANT.

ACUTE EXPOSURE- CONTACT WITH DUST OR FUMES MAY CAUSE IRRITATION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
SELENIUM:
IRRITANT.

ACUTE EXPOSURE- HIGH CONCENTRATIONS OF FUME MAY CAUSE SEVERE IRRITATION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:
SELENIUM:

ACUTE EXPOSURE- ELEMENTAL SELENIUM IS POORLY ABSORBED FROM THE GASTROINTESTINAL TRACT. INGESTION OF SELENIUM COMPOUNDS MAY CAUSE SEVERE

IRRITATION AND DISTURBANCES OF THE GASTROINTESTINAL TRACT AND A METALLIC TASTE IN THE MOUTH.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION MAY CAUSE EFFECTS SIMILAR TO THOSE AS DETAILED IN CHRONIC INHALATION. IN ADDITION, SYMPTOMS MAY INCLUDE PARTIAL LOSS OF HAIR AND NAIL CHANGES. ADDITIONAL DATA REPORTED IN ANIMALS INCLUDES ANEMIA, LIVER, KIDNEY AND HEART DAMAGE, STERILITY AND CONGENITAL DEFECTS.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. FOLLOW WITH A SALINE CATHARTIC. MAINTAIN BLOOD PRESSURE, AIRWAY, AND GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY. (GOSSELIN, CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 5TH EDITION). ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

SELENIUM:

ALKALI METAL AMIDES: PRODUCES EXPLOSIVE PRODUCTS.

ALKALINE EARTH METAL AMIDES: PRODUCES EXPLOSIVE PRODUCTS.

BARIUM PEROXIDE: IGNITES AT 265 C.

BROMINE PENTAFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

CADMIUM: POSSIBLE EXPLOSION WHEN HEATED.

CHLORINE TRIFLUORIDE: REACTS VIOLENTLY, IGNITION OFTEN OCCURRING.

CHROMIC ANHYDRIDE: VIOLENT REACTION.

FLUORINE: IGNITES ON CONTACT.

LITHIUM SILICIDE: INCANDESCENT REACTION.

METAL ACETYLIDES: INCANDESCENT REACTION ON HEATING.

METAL CARBIDES: INCANDESCENT REACTION ON HEATING.

METAL CHLORATES (EXCEPT ALKALI): INCANDESCENT REACTION IN THE PRESENCE OF WATER.

METALS: CONTACT OF MANY METALS WITH SELENIUM RESULTS IN INCANDESCENCE.

NITROGEN TRICHLORIDE: EXPLODES ON CONTACT.

ORGANIC MATERIALS + OXYGEN: MAY RESULT IN EXPLOSIVE OXIDATION.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

PHOSPHORUS: INCANDESCENT REACTION WHEN HEATED.

POTASSIUM: INCANDESCENCE REACTION WITH POSSIBLE EXPLOSION.

POTASSIUM BROMATE: VIOLENT, EXPLOSIVE REACTION.

SILVER BROMATE: VIOLENT EXPLOSIVE REACTION.

SILVER OXIDE: IGNITION ON GRINDING.

SODIUM PEROXIDE: FORMS EXPLOSIVE MIXTURE.

TIN (POWDERED): EXTREMELY EXOTHERMIC, INCANDESCENT REACTION.

ZINC: POSSIBLE EXPLOSION ON HEATING.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC FUMES OF SELENIUM.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISSOLVE IN STRONG HYDROCHLORIC ACID SOLUTION. SLOWLY ADD SODIUM SULFITE TO COLD SOLUTION. HEAT TO RECOVER SELENIUM. FILTER, DRY, AND SHIP TO SUPPLIER.

SELENIUM - REGULATORY LEVEL: 1.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D010.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. PREVENT DISPERSION OF DUST IN AIR. DO NOT ALLOW SPILLED MATERIAL TO CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 100 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

 PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

SELENIUM AND COMPOUNDS (AS SE):

2 MG/M3- ANY DUST AND MIST RESPIRATOR WITH A FULL FACEPIECE.*
 ANY SUPPLIED-AIR RESPIRATOR.
 ANY SELF-CONTAINED BREATHING APPARATUS.

5 MG/M3- ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.*
 ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW MODE.

10 MG/M3- 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.

100 MG/M3- ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS
 OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY
 PARTICULATE FILTER.
 ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

* IF NOT PRESENT AS A FUME.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT
 TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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SILVER MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS20770

CAS#: 7440-22-4 FORMULA: AG

SILVER IS A WHITE SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BLUE-GRAY DISCOLORATION OF THE NOSE, THROAT, SKIN, AND EYES.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, MAY CAUSE DIFFICULTY BREATHING WITH COUGH.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS20770

7440-22-4

SILVER

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OHS20770

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-22-4
RTECS NUMBER: VW3500000

SUBSTANCE: SILVER

TRADE NAMES/SYNONYMS:

ALGAEDYN; ARGENTUM; C.I. 77820; E 20; L 3; SHELL SILVER; SILFLAKE 135;
SILPOWDER 130; SILVER ATOM; SILVER ELEMENT; SILVER METAL; SILVEST TCG 1;
SR 999; TCG 7R; V 9; XA 208; S-163,S-166,S-167;
FSP, FSF, FS CRYSTAL, FSS, FSW, FS SHOT, FS ANODES (METZ METALLURGICAL
CORPORATION);
AG; OHS20770

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: AG

MOLECULAR WEIGHT: 107.868

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: SILVER
CAS# 7440-22-4

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

SILVER, METAL (AS AG):

0.01 MG/M3 OSHA TWA
0.1 MG/M3 ACGIH TWA (DUST AND FUME)
0.01 MG/M3 NIOSH RECOMMENDED TWA
0.01 MG/M3 DFG MAK TWA (TOTAL DUST);
0.1 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; INDUCTIVELY COUPLED PLASMA;
(NIOSH VOL. III # 7300, ELEMENTS).

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: SOFT, DUCTILE, LUSTROUS, WHITE SOLID.

BOILING POINT: 3852 F (2122 C) MELTING POINT: 1763 F (962 C)

SPECIFIC GRAVITY: 10.5 VAPOR PRESSURE: 100 MMHG @ 1865 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN NITRIC ACID, HOT SULFURIC ACID, POTASSIUM CYANIDE, ALKALI HYDROXIDES, ALKALI CYANIDE SOLUTIONS; INSOLUBLE IN ALKALIES.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLECTIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

TOXICITY

SILVER:
TOXICITY DATA: TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION: SILVER:

ACUTE EXPOSURE- IMPREGNATION OF THE MUCOUS MEMBRANES BY FINE PARTICLES OF METALLIC SILVER MAY CAUSE LOCALIZED ARGYRIA.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE (2-25 YEARS) TO SILVER DUSTS MAY CAUSE A PERMANENT LOCALIZED BLUE-GREY DISCOLORATION OF THE SKIN, MUCOUS MEMBRANES, AND EYES (ARGYRIA), WITHOUT EVIDENCE OF TISSUE REACTION. DISCOLORATION IS FIRST APPARENT IN THE CONJUNCTIVA, WITH SOME LOCALIZATION IN THE INNER CANTHUS. IN SEVERE CASES, THE SKIN MAY BECOME BLACK WITH A METALLIC LUSTER AND THE EYES MAY BE AFFECTED TO THE POINT THAT THE LENS AND VISION ARE DISTURBED. THE RESPIRATORY TRACT MAY ALSO BE AFFECTED PRODUCING A MILD CHRONIC BRONCHITIS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT: SILVER:

ACUTE EXPOSURE- IMPREGNATION OF THE SKIN BY FINE PARTICLES OF METALLIC SILVER MAY CAUSE LOCALIZED ARGYRIA.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO SILVER DUST MAY CAUSE LOCALIZED ARGYRIA.

FIRST AID- 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.

EYE CONTACT: SILVER:

ACUTE EXPOSURE- CONTACT WITH SILVER DUST MAY CAUSE LOCALIZED ARGYRIA.

APPLICATION OF SMALL PARTICLES OF METALLIC SILVER IN THE ANTERIOR CHAMBER OF RABBIT EYES CAUSED LITTLE REACTION; CAUSED ATROPHIC CHANGES IN THE RETINA WHEN PLACED IN THE VITREOUS; AND REACTED WITH SURROUNDING TISSUE WHEN PLACED IN THE CORNEA.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO SILVER DUSTS MAY CAUSE LOCALIZED ARGYRIA.

FIRST AID- WASH 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.

INGESTION:

SILVER:

ACUTE EXPOSURE- INGESTION OF SILVER BY EXPERIMENTAL ANIMALS WAS RAPIDLY AND ALMOST COMPLETELY ELIMINATED IN THE FECES WITHIN DAYS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

SILVER:

ACETYLENE (AND COMPOUNDS): FORMS EXPLOSIVE SILVER ACETYLIDE.
AMMONIA: FORMS EXPLOSIVE COMPOUNDS.
AZIRIDINE: FORMATION OF EXPLOSIVE COMPOUNDS.
BROMOAZIDE: PROBABLE EXPLOSION.
1-BROMO-2-PROPYNE: EXPLOSION HAZARD.
CARBON: REACTS VIOLENTLY.
CHLORINE TRIFLUORIDE: POSSIBLE IGNITION.
ETHYLENEIMINE: FORMS EXPLOSIVE COMPOUND.
ETHYLENE OXIDE + TRACES OF ACETYLENE: MAY FORM EXPLOSIVE SILVER ACETYLIDE.
ETHYL HYDROPEROXIDE: EXPLOSION HAZARD.
HYDROGEN PEROXIDE: IGNITION OR VIOLENT DECOMPOSITION.
IODOFORM: REACTS WITH INCANDESCENCE.
NITRIC ACID + ETHYL ALCOHOL: FORMS EXPLOSIVE COMPOUNDS.
OXALIC ACID: FORMS EXPLOSIVE COMPOUND.
OZONIDES: DECOMPOSED, POSSIBLY EXPLOSIVELY.
PERMONOSULFURIC ACID: EXPLOSIVE DECOMPOSITION.
PEROXYFORMIC ACID: REACTS EXPLOSIVELY.
SULFURIC ACID: REACTS VIOLENTLY.
TARTARIC ACID: FORMATION OF EXPLOSIVE SALT.
ZINC + ELECTROLYTES: POSSIBLE SPONTANEOUS IGNITION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING

OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

SILVER - REGULATORY LEVEL: 5.0 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D011.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND

IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

SILVER (METAL AND SOLUBLE COMPOUNDS):

0.25 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

0.5 MG/M3- 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.

20.0 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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SODIUM METAL MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS20850

CAS#: 7440-23-5 FORMULA: NA

SODIUM METAL IS AN ODORLESS, SILVER METAL.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, SKIN, AND EYES, AND STOMACH; POSSIBLY DEEP. BLINDNESS AND EYE DAMAGE MAY OCCUR. ADDITIONAL EFFECTS MAY INCLUDE DIZZINESS, FEVER, LOW BLOOD PRESSURE, WEAK AND RAPID PULSE, DROOLING, FOAMING AT THE MOUTH, CHEST PAIN, LUNG CONGESTION, DIFFICULTY OR INABILITY TO SWALLOW OR SPEAK, DIARRHEA, BOMITING BLOOD, COLDNESS, FAINTING, SUFFOCATION WITH BLUISH COLOR OF THE SKIN, LIPS, AND FINGERNAILS, AND INTESTINAL DAMAGE.

LONG TERM EXPOSURE: SAME EFFECTS AS SHORT TERM EXPOSURE.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT DANGEROUSLY WITH AIR AND MOISTURE AND MAY RELEASE A FLAMMABLE GAS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS20850

7440-23-5

SODIUM METAL

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MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-23-5
RTECS NUMBER: VY0686000

SUBSTANCE: SODIUM METAL

TRADE NAMES/SYNONYMS:

SODIUM; SODIUM-23; SODIUM ATOM; METALLIC SODIUM; STCC 4916456; UN 1428; NA;
OHS20850

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: NA

MOLECULAR WEIGHT: 22.99

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=2 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=1 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: SODIUM METAL
CAS# 7440-23-5

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

SODIUM METAL:

10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: ODORLESS, MALLEABLE, SILVER METAL.

BOILING POINT: 1621 F (883 C) MELTING POINT: 207-208 F (97-98 C)

SPECIFIC GRAVITY: 0.97 VAPOR PRESSURE: 1.2 MMHG @ 400 C

SOLUBILITY IN WATER: REACTS

SOLVENT SOLUBILITY: INSOLUBLE IN BENZENE, NAPHTHA, KEROSENE, ETHER.

VISCOSITY: 0.680 CPS @ 100 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MAY IGNITE SPONTANEOUSLY ON EXPOSURE TO AIR.

AUTOIGNITION TEMP.: >239 F (>115 C)

FIREFIGHTING MEDIA:
DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT
WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

EXTINGUISH USING AGENTS INDICATED. AVOID BREATHING FUMES.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.206
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
SODIUM-UN 1428

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:

4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
DANGEROUS WHEN WET

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.244

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 50 KG

TOXICITY

SODIUM METAL:
TOXICITY DATA: 4 GM/KG INTRAPERITONEAL-MOUSE LD50.
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYES, INGESTION.
ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.
TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
SODIUM METAL:
CORROSIVE.

MAY REACT WITH MOISTURE TO FORM SODIUM HYDROXIDE, AN ALKALINE CORROSIVE. SEE
INFORMATION ON ALKALINE CORROSIVES.

ALKALINE CORROSIVES:

ACUTE EXPOSURE- MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT WITH COUGHING,
CHOKING, PAIN AND POSSIBLY BURNS OF THE MUCOUS MEMBRANES. IN SOME CASES,
PULMONARY EDEMA MAY DEVELOP, EITHER IMMEDIATELY IN SEVERE CASES OR MORE
OFTEN WITH A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE
TIGHTNESS IN THE CHEST, DYSPNEA, FROTHY SPUTUM, CYANOSIS, AND DIZZINESS.
PHYSICAL FINDINGS MAY INCLUDE HYPOTENSION, WEAK AND RAPID PULSE AND MOIST
RALES. SEVERE CASES MAY BE FATAL.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE,
REPEATED OR PROLONGED EXPOSURE MAY CAUSE INFLAMMATORY AND ULCERATIVE
CHANGES IN THE MOUTH AND POSSIBLY BRONCHIAL AND GASTROINTESTINAL
DISTURBANCES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
SODIUM METAL:
CORROSIVE.

MAY REACT WITH MOISTURE TO FORM SODIUM HYDROXIDE, AN ALKALINE CORROSIVE. SEE INFORMATION ON ALKALINE CORROSIVES.

ALKALINE CORROSIVES:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE PAIN, BURNS AND POSSIBLY BROWNISH STAINS. THE CORRODED AREAS MAY BE SOFT, GELATINOUS AND NECROTIC AND THE TISSUE DESTRUCTION MAY BE DEEP.

CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT MAY CAUSE DERMATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
SODIUM METAL:
CORROSIVE.

MAY REACT WITH MOISTURE TO FORM SODIUM HYDROXIDE, AN ALKALINE CORROSIVE. SEE INFORMATION ON ALKALINE CORROSIVES.

ALKALINE CORROSIVES:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE PAIN AND BURNS. THERE MAY BE EDEMA, DESTRUCTION OF EPITHELIUM, CORNEAL OPACIFICATION AND IRITIS. WHEN DAMAGE IS LESS THAN EXCESSIVE, THESE SYMPTOMS TEND TO AMELIORATE. IN SEVERE BURNS, THE FULL EXTENT OF THE INJURY MAY NOT BE IMMEDIATELY APPARENT. LATE COMPLICATIONS MAY INCLUDE PERSISTENT EDEMA, VASCULARIZATION AND SCARRING OF THE CORNEA, PERMANENT OPACITY, STAPHYLOMA, CATARACT, SYMBLEPHARON AND BLINDNESS.

CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT MAY RESULT IN CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
SODIUM METAL:
CORROSIVE.

MAY REACT WITH MOISTURE TO FORM SODIUM HYDROXIDE, AN ALKALINE CORROSIVE. SEE

INFORMATION ON ALKALINE CORROSIVES.

ALKALINE CORROSIVES:

ACUTE EXPOSURE- MAY CAUSE IMMEDIATE PAIN, CIRCUMORAL BURNS AND CORROSION OF THE MUCOUS MEMBRANES WHICH AT FIRST TURN WHITE AND SOAPY AND THEN BECOME BROWN, EDEMATOUS AND ULCERATED. THERE MAY BE PROFUSE SALIVATION AND DIFFICULTY OR INABILITY TO SWALLOW OR SPEAK. EVEN WHEN THERE IS NO EVIDENCE OF ORAL BURNS, THE ESOPHAGUS AND STOMACH MAY BE INVOLVED WITH BURNING PAIN, VOMITING AND DIARRHEA. THE VOMITUS MAY BE THICK AND SLIMY WITH MUCOUS, AND LATER CONTAIN BLOOD AND SHREDS OF MUCOSA. EPIGLOTTAL EDEMA MAY RESULT IN RESPIRATORY DISTRESS AND POSSIBLY ASPHYXIA. SHOCK WITH MARKED HYPOTENSION, WEAK AND RAPID PULSE, SHALLOW RESPIRATION, AND CLAMMY SKIN MAY OCCUR. CIRCULATORY COLLAPSE MAY ENSUE, AND IF UNCORRECTED, LEAD TO RENAL FAILURE. IN SEVERE CASES, ESOPHAGEAL OR GASTRIC PERFORATION ARE POSSIBLE AND MAY BE ACCOMPANIED BY MEDIASTINITIS, SUBSTERNAL PAIN, PERITONITIS, ABDOMINAL RIGIDITY, AND FEVER. ESOPHAGEAL, AND POSSIBLY GASTRIC OR PYLORIC STRICTURE, MAY OCCUR WITHIN A FEW WEEKS, BUT MAY BE DELAYED FOR MONTHS OR EVEN YEARS. DEATH MAY RESULT WITHIN A SHORT TIME FROM ASPHYXIA, CIRCULATORY COLLAPSE, OR ASPIRATION OF EVEN MINUTE AMOUNTS. IF DEATH IS DELAYED IT MAY BE DUE TO THE COMPLICATIONS OF PERFORATION, PNEUMONIA, OR THE EFFECTS OF STRICTURE FORMATION.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION MAY RESULT IN INFLAMMATORY AND ULCERATIVE EFFECTS ON THE ORAL MUCOUS MEMBRANES AND OTHER EFFECTS AS WITH ACUTE INGESTION.

FIRST AID- DILUTE THE ALKALI BY GIVING WATER OR MILK IMMEDIATELY AND ALLOW VOMITING TO OCCUR. AVOID GASTRIC LAVAGE OR EMETICS. ESOPHAGOSCOPY IS THE ONLY WAY TO EXCLUDE THE POSSIBILITY OF CORROSION IN THE UPPER GASTROINTESTINAL TRACT; IF CORROSION IS SUSPECTED, ESOPHAGOSCOPY SHOULD USUALLY BE PERFORMED WITHIN 24 HOURS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). MAINTAIN AIRWAY AND TREAT SHOCK. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

MAY IGNITE SPONTANEOUSLY IN AIR. REACTS VIOLENTLY ON CONTACT WITH WATER OR MOISTURE. REACTION MAY GENERATE SUFFICIENT HEAT TO IGNITE THE EVOLVED HYDROGEN, RESULTING IN A FIRE OR EXPLOSION.

INCOMPATIBILITIES:

SODIUM METAL:

ACIDS: EXPLOSIVE REACTION, PARTICULARLY WITH AQUEOUS SOLUTIONS.

ALKYL OXALATES: FORM SHOCK-SENSITIVE MIXTURES.

AMMONIUM NITRATE: FORMS EXPLOSIVE COMPOUND.

CARBON DISULFIDE: FORMS SHOCK-SENSITIVE MIXTURES.

DIAZOMETHANE: EXPLODES ON CONTACT.

DIMETHYLFORMAMIDE: VIGOROUS REACTION WHEN HEATED.

ETHANOL: EXOTHERMIC REACTION.

FLUORINATED COMPOUNDS: EXPLODE AT ELEVATED TEMPERATURES.
 HALIDE OXIDES: FORM SHOCK-SENSITIVE MIXTURES.
 HALOCARBONS: FORM SHOCK-SENSITIVE MIXTURES.
 HALOGENS: MAY IGNITE OR FORM SHOCK-SENSITIVE MIXTURES.
 HYDRAZINE: FORMS EXPLOSIVE COMPOUND.
 HYDROXYLAMINE: FORMS SPONTANEOUSLY FLAMMABLE COMPOUND.
 INTERHALOGENS: MAY IGNITE OR FORM SHOCK-SENSITIVE MIXTURE.
 IODATES: FORMS SHOCK-SENSITIVE MIXTURE.
 MALEIC ANHYDRIDE: EXPLOSIVE DECOMPOSITION REACTION.
 MERCURY: VIOLENT EXOTHERMIC REACTION.
 MERCURY OXIDE: MAY EXPLODE.
 METAL HALIDES: FORM SHOCK-SENSITIVE MIXTURES.
 METAL OXIDES: INCANDESCENT REACTION AND POSSIBLE IGNITION.
 MONOAMMONIUM PHOSPHATE: POSSIBLE EXPLOSIVE REACTION.
 NAPHTHALENE + AMMONIA: MAY EXPLODE ON DRYING.
 NITRIC ACID: POSSIBLE IGNITION.
 NITROGEN CONTAINING EXPLOSIVES: MAY INCREASE SHOCK-SENSITIVITY.
 NITROSYL FLUORIDE: INCANDESCENT REACTION.
 NITRYL FLUORIDE: INCANDESCENT REACTION.
 NON-METALS: VIGOROUS OR POSSIBLY VIOLENT REACTION.
 NON-METAL HALIDES: MAY IGNITE OR EXPLODE.
 NON-METAL OXIDES: MAY IGNITE OR FORM EXPLOSIVE MIXTURES.
 SODIUM NITRATE: FORMS EXPLOSIVE COMPOUND.
 SODIUM PEROXIDE: EXPLOSIVE REACTION.
 SULFIDE OXIDES: FORM SHOCK-SENSITIVE MIXTURE.
 2,2,3,3-TETRAFLUOROPROPANOL: MAY CAUSE VIOLENT IGNITION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC FUMES OF SODIUM OXIDE.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

PROTECT AGAINST PHYSICAL DAMAGE. KEEP AWAY FROM WATER OR LOCATIONS WHERE WATER MAY BE NEEDED FOR FIRE IN OTHER STORAGE OR INVOLVING THE BUILDING. AVOID HIGH TEMPERATURES. STORE UNDER NITROGEN OR KEROSENE. NEVER STORE UNDER HALOGENATED HYDROCARBONS. A DETACHED FIRE-RESISTIVE BUILDING IS RECOMMENDED FOR QUANTITY STORAGE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D003.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A PIT, POND, OR LAGOON TO HOLD MATERIAL.
COVER WITH OIL.

WATER SPILL:

LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 10 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND

IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/18/84 REVISION DATE: 02/25/92

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SODIUM POTASSIUM ALLOY, M.P. 66 MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS21560

CAS#: 11135-81-2 FORMULA: KNA

SODIUM POTASSIUM ALLOY, M.P. 66 IS A SILVERY-WHITE TO YELLOW-ORANGE LIQUID OR A SOLID.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. DANGEROUS EXPLOSION HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO PUT OUT THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, MOUTH, STOMACH, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE NAUSEA, VOMITING, AND STOMACH PAIN.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ALL WET CLOTHING OR SHOES. WIPE THE SUBSTANCE FROM THE SKIN. WASH EXPOSED PARTS WITH FLOODING AMOUNTS OF WATER AND SOAP. FLUSH EYES WITH FLOODING AMOUNTS OF WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT WITH WATER GENERATING MUCH HEAT AND DANGEROUS SUBSTANCES. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS21560

11135-81-2

SODIUM POTASSIUM ALLOY, M.P. 66

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OHS21560

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 11135-81-2
RTECS NUMBER: TT5790000

SUBSTANCE: SODIUM POTASSIUM ALLOY, M.P. 66

TRADE NAMES/SYNONYMS:
POTASSIUM SODIUM ALLOY; NACK; STCC 4916459; UN 1422; OHS21560

CHEMICAL FAMILY:
METAL ALLOY

MOLECULAR FORMULA: K-NA

MOLECULAR WEIGHT: 62.09

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=3 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=3

COMPONENTS AND CONTAMINANTS

COMPONENT: SODIUM PERCENT: 44

COMPONENT: POTASSIUM PERCENT: 56

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: A SILVERY-WHITE LIQUID AT OR NEAR ROOM TEMPERATURE TURNING TO
YELLOW-ORANGE ON EXPOSURE TO AIR OR MAY ALSO EXIST AS A SOFT SOLID.

MELTING POINT: 66 F (19 C)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MAY IGNITE SPONTANEOUSLY ON EXPOSURE TO AIR.

FLASH POINT: FLAMMABLE SOLID

FIREFIGHTING MEDIA:

DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT
WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

USE AGENTS INDICATED, DO NOT USE WATER OR CARBON DIOXIDE. AVOID BREATHING
TOXIC VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.206
EXCEPTIONS: NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.202
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
POTASSIUM SODIUM ALLOYS-UN 1422

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG I

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
DANGEROUS WHEN WET

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.211
BULK PACKAGING: 49 CFR 173.244

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 15 KG

TOXICITY

SODIUM POTASSIUM ALLOY:
CARCINOGEN STATUS: NONE.

THERE IS INSUFFICIENT DATA TO QUANTIFY THE TOXICITY OF SODIUM POTASSIUM ALLOY. IT IS CORROSIVE TO THE SKIN, EYES AND MUCOUS MEMBRANES.

HEALTH EFFECTS AND FIRST AID

INHALATION:
SODIUM POTASSIUM ALLOY:
CORROSIVE.

ACUTE EXPOSURE- INHALATION OF VAPORS OR FINE PARTICLES MAY CAUSE SEVERE MUCOUS MEMBRANE IRRITATION AND POSSIBLE THERMAL BURNS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
SODIUM POTASSIUM ALLOY:
CORROSIVE.

ACUTE EXPOSURE- CONTACT WITH LIQUID MAY CAUSE SEVERE IRRITATION AND BURNS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.

FIRST AID- DO NOT APPLY WATER TO THE SKIN. FLOOD CONTAMINATED AREAS OF THE BODY WITH 1% SOLUTION OF STEARIC ACID IN MINERAL OIL. REMOVE METAL BY GENTLY SCRAPING WITH A SPATULA; DO NOT BRUSH OR WIPE AWAY. FOLLOW WITH SYMPTOMATIC AND SUPPORTIVE MEASURES. (HANDBOOK OF INDUSTRIAL TOXICOLOGY, PLUNKETT). GET MEDICAL ATTENTION.

EYE CONTACT:

SODIUM POTASSIUM ALLOY:

CORROSIVE.

ACUTE EXPOSURE- CONTACT WITH LIQUID, FINE PARTICLES OR VAPORS MAY CAUSE SEVERE IRRITATION AND POSSIBLE THERMAL BURNS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS,

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

SODIUM POTASSIUM ALLOY:

CORROSIVE.

ACUTE EXPOSURE- MAY CAUSE CORROSION OF THE GASTRIC MUCOSA WITH ABDOMINAL PAIN, NAUSEA AND VOMITING.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION AND ADVICE IMMEDIATELY ON WHETHER TO USE GASTRIC LAVAGE. GASTRIC LAVAGE PERFORMED BY QUALIFIED MEDICAL PERSONNEL MAY BE SUITABLE IF THERE ARE NO SIGNS OF PERFORATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

REACTS VIOLENTLY WITH MOISTURE AND MAY IGNITE. MAY IGNITE SPONTANEOUSLY IN AIR; THE REACTION MAY PRODUCE HYDROGEN WITH SUFFICIENT HEAT TO IGNITE THE HYDROGEN IN AIR. CONTACT WITH MOISTURE MAY PRODUCE CAUSTIC SODIUM HYDROXIDE AND POTASSIUM HYDROXIDE.

INCOMPATIBILITIES:

SODIUM POTASSIUM ALLOY:

FLUOROPOLYMERS: BURN VIGOROUSLY.

POLYTETRAFLUOROETHYLENE: EXPLODES.

SODIUM CARBONATE: EXPLODES.

POTASSIUM OXIDES: EXPLODES.

TERT-BUTANOL: IGNITES.

OXIDIZING MATERIALS: REACT VIGOROUSLY.

CARBON DISULFIDE: EXPLODES IF SHOCKED.

ACIDS, ACID FUMES, ACID MISTS: REACT EXPLOSIVELY.

HALOGENS: REACT EXPLOSIVELY.

AMMONIUM SULFATE + AMMONIUM NITRATE: EXPLODES.

BROMOFORM: EXPLODES.

TETRACHLOROETHANE: EXPLODES.

PENTACHLOROETHANE: EXPLODES.

SOLID CARBON DIOXIDE: EXPLODES IF SHOCKED.

CARBON TETRACHLORIDE: EXPLODES.
 CHLOROFORM: EXPLODES.
 DICHLOROMETHANE: EXPLODES.
 DIIODOMETHANE: EXPLODES.
 MERCURIC OXIDE: EXPLODES.
 OXALYL BROMIDE: EXPLODES.
 OXALYL CHLORIDE: EXPLODES.
 SILVER HALIDES: EXPLODES.
 1,1,1-TRICHLOROETHANE: EXPLODES.
 TRICHLOROTRIFLUOROETHANE: EXPLODES.
 METAL HALIDES: EXPLOSIVE.
 METAL OXIDES: EXPLOSIVE WHEN SHOCKED.
 NITROGEN CONTAINING EXPLOSIVES: INCOMPATIBLE.

DECOMPOSITION:
 RELEASES TOXIC AND HAZARDOUS SODIUM OXIDE AND POTASSIUM OXIDE UPON
 DECOMPOSITION.

POLYMERIZATION:
 HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL
 TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

STORAGE: PROTECT AGAINST PHYSICAL DAMAGE. KEEP AWAY FROM WATER OR LOCATIONS
 WHERE WATER MAY BE NEEDED FOR FIRE INVOLVING OTHER STORAGE OR THE
 BUILDING. AVOID HIGH TEMPERATURES. STORE UNDER NITROGEN, ARGON, OR
 HELIUM. A DETACHED FIRE-RESISTIVE BUILDING IS RECOMMENDED FOR QUANTITY
 STORAGE. IF SPRINKLER SYSTEMS ARE REQUIRED TO PROTECT COMBUSTIBLE
 CONSTRUCTION OR OCCUPANCIES, THEY SHOULD REMAIN IN SERVICE. HOODS MAY
 BE ERECTED TO SHIELD THE METAL FROM SPRINKLER DISCHARGE (NFPA 49,
 HAZARDOUS CHEMICALS DATA, 1975).

CONDITIONS TO AVOID

AVOID HEATING TO DECOMPOSITION AND CONTACT WITH OR STORAGE WITH INCOMPATIBLE
 SUBSTANCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
 DIG A HOLDING AREA SUCH AS PIT, POND OR LAGOON TO CONTAIN SPILLED MATERIAL.
 USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT DISSOLVING IN
 FIREFIGHTING WATER OR RAIN.

WATER SPILL:
 NEUTRALIZE WITH VINEGAR OR OTHER DILUTE ACID.

OCCUPATIONAL SPILL:
 SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU
 CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE

CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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SODIUM POTASSIUM ALLOY, M.P. 12 MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS21561

CAS#: 11135-81-2 FORMULA: KNA

SODIUM POTASSIUM ALLOY, M.P. 12 IS A SILVERY OR YELLOW-ORANGE LIQUID OR SOLID.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. DANGEROUS EXPLOSION HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO PUT OUT THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, MOUTH, STOMACH, SKIN, AND EYES. ADDITIONAL EFFECTS INCLUDE NAUSEA, VOMITING, AND STOMACH PAIN.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT WITH WATER GENERATING MUCH HEAT AND DANGEROUS SUBSTANCES. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS21561

11135-81-2

SODIUM POTASSIUM ALLOY, M.P. 12

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OHS21561

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 11135-81-2
RTECS NUMBER: TT5790000

SUBSTANCE: SODIUM POTASSIUM ALLOY, M.P. 12

TRADE NAMES/SYNONYMS:

POTASSIUM SODIUM ALLOY; NACK; STCC 4916459; UN 1422; OHS21561

CHEMICAL FAMILY:

METAL ALLOY

MOLECULAR FORMULA: K-NA

MOLECULAR WEIGHT: 62.09

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=3 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=3

COMPONENTS AND CONTAMINANTS

COMPONENT: SODIUM

PERCENT: 22

COMPONENT: POTASSIUM

PERCENT: 78

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: SILVERY LIQUID AT ROOM TEMPERATURE WHICH TURNS YELLOW-ORANGE
UPON EXPOSURE TO AIR; IT ALSO EXISTS AS A SOFT SOLID.

MELTING POINT: 12 F (-11 C)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MAY IGNITE SPONTANEOUSLY ON EXPOSURE TO AIR.

FLASH POINT: FLAMMABLE SOLID

FIREFIGHTING MEDIA:

DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT
WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

USE AGENTS INDICATED, DO NOT USE WATER OR CARBON DIOXIDE. AVOID BREATHING
TOXIC VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.202
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
POTASSIUM SODIUM ALLOYS-UN 1422

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG I

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:

DA
DANGEROUS WHEN WET

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:

EXCEPTIONS: NONE

NON-BULK PACKAGING: 49 CFR 173.211

BULK PACKAGING: 49 CFR 173.244

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:

PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN

CARGO AIRCRAFT ONLY: 15 KG

TOXICITY

SODIUM POTASSIUM ALLOY:

CARCINOGEN STATUS: NONE.

THERE IS INSUFFICIENT DATA TO QUANTIFY THE TOXICITY OF SODIUM POTASSIUM ALLOY. IT IS CORROSIVE TO THE SKIN, EYES AND MUCOUS MEMBRANES.

HEALTH EFFECTS AND FIRST AID

INHALATION:

SODIUM POTASSIUM ALLOY:

CORROSIVE.

ACUTE EXPOSURE- INHALATION OF VAPORS OR FINE PARTICLES MAY CAUSE SEVERE MUCOUS MEMBRANE IRRITATION AND POSSIBLE THERMAL BURNS.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

SODIUM POTASSIUM ALLOY:

CORROSIVE.

ACUTE EXPOSURE- CONTACT WITH LIQUID MAY CAUSE SEVERE IRRITATION AND BURNS. CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.

FIRST AID- DO NOT APPLY WATER TO THE SKIN. FLOOD CONTAMINATED AREAS OF THE BODY WITH 1% SOLUTION OF STEARIC ACID IN MINERAL OIL. REMOVE METAL BY GENTLY SCRAPING WITH A SPATULA; DO NOT BRUSH OR WIPE AWAY. FOLLOW WITH SYMPTOMATIC AND SUPPORTIVE MEASURES. (HANDBOOK OF INDUSTRIAL TOXICOLOGY, PLUNKETT). GET MEDICAL ATTENTION.

EYE CONTACT:

SODIUM POTASSIUM ALLOY:

CORROSIVE.

ACUTE EXPOSURE- CONTACT WITH LIQUID, FINE PARTICLES OR VAPORS MAY CAUSE SEVERE IRRITATION AND POSSIBLE THERMAL BURNS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS,

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

SODIUM POTASSIUM ALLOY:

CORROSIVE.

ACUTE EXPOSURE- MAY CAUSE CORROSION OF THE GASTRIC MUCOSA WITH ABDOMINAL PAIN, NAUSEA AND VOMITING.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION AND ADVICE IMMEDIATELY ON WHETHER TO USE GASTRIC LAVAGE. GASTRIC LAVAGE PERFORMED BY QUALIFIED MEDICAL PERSONNEL MAY BE SUITABLE IF THERE ARE NO SIGNS OF PERFORATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

REACTS VIOLENTLY WITH MOISTURE AND MAY IGNITE. MAY IGNITE SPONTANEOUSLY IN AIR; THE REACTION MAY PRODUCE HYDROGEN WITH SUFFICIENT HEAT TO IGNITE THE HYDROGEN IN AIR. CONTACT WITH MOISTURE MAY PRODUCE CAUSTIC SODIUM HYDROXIDE AND POTASSIUM HYDROXIDE.

INCOMPATIBILITIES:

SODIUM POTASSIUM ALLOY:

FLUOROPOLYMERS: BURN VIGOROUSLY.

POLYTETRAFLUOROETHYLENE: EXPLODES.

SODIUM CARBONATE: EXPLODES.

POTASSIUM OXIDES: EXPLODES.

TERT-BUTANOL: IGNITES.

OXIDIZING MATERIALS: REACT VIGOROUSLY.

CARBON DISULFIDE: EXPLODES IF SHOCKED.

ACIDS, ACID FUMES, ACID MISTS: REACT EXPLOSIVELY.

HALOGENS: REACT EXPLOSIVELY.

AMMONIUM SULFATE + AMMONIUM NITRATE: EXPLODES.

BROMOFORM: EXPLODES.

TETRACHLOROETHANE: EXPLODES.

PENTACHLOROETHANE: EXPLODES.

SOLID CARBON DIOXIDE: EXPLODES IF SHOCKED.

CARBON TETRACHLORIDE: EXPLODES.

CHLOROFORM: EXPLODES.

DICHLOROMETHANE: EXPLODES.

DIIODOMETHANE: EXPLODES.
 MERCURIC OXIDE: EXPLODES.
 OXYLYL BROMIDE: EXPLODES.
 OXALYL CHLORIDE: EXPLODES.
 SILVER HALIDES: EXPLODES.
 1,1,1-TRICHLOROETHANE: EXPLODES.
 TRICHLOROTRIFLUOROETHANE: EXPLODES.
 METAL HALIDES: EXPLOSIVE.
 METAL OXIDES: EXPLOSIVE WHEN SHOCKED.
 NITROGEN CONTAINING EXPLOSIVES: INCOMPATIBLE.

DECOMPOSITION:

RELEASES TOXIC AND HAZARDOUS SODIUM OXIDE AND POTASSIUM OXIDE UPON DECOMPOSITION.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

 STORAGE AND DISPOSAL

STORAGE: PROTECT AGAINST PHYSICAL DAMAGE. KEEP AWAY FROM WATER OR LOCATIONS WHERE WATER MAY BE NEEDED FOR FIRE INVOLVING OTHER STORAGE OR THE BUILDING. AVOID HIGH TEMPERATURES. STORE UNDER NITROGEN, ARGON, OR HELIUM. A DETACHED FIRE-RESISTIVE BUILDING IS RECOMMENDED FOR QUANTITY STORAGE. IF SPRINKLER SYSTEMS ARE REQUIRED TO PROTECT COMBUSTIBLE CONSTRUCTION OR OCCUPANCIES, THEY SHOULD REMAIN IN SERVICE. HOODS MAY BE ERECTED TO SHIELD THE METAL FROM SPRINKLER DISCHARGE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

 CONDITIONS TO AVOID

AVOID HEATING TO DECOMPOSITION AND CONTACT WITH OR STORAGE WITH INCOMPATIBLE SUBSTANCES.

 SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS PIT, POND OR LAGOON TO CONTAIN SPILLED MATERIAL. USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT DISSOLVING IN FIREFIGHTING WATER OR RAIN.

WATER SPILL:

NEUTRALIZE WITH VINEGAR OR OTHER DILUTE ACID.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO

CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE

EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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STODDARD SOLVENT MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS21900

CAS#: 8052-41-3 FORMULA: UNASSIGNED

STODDARD SOLVENT IS A CLEAR LIQUID WITH A KEROSENE-LIKE ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 100-140 F (38-60 C). MODERATE FIRE HAZARD. VAPOR-AIR MIXTURES MAY BE EXPLOSIVE. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, NAUSEA, VOMITING, COUGHING WITH BLOOD, DIFFICULTY BREATHING, LUNG CONGESTION, SEIZURES, HEART ATTACK, AND UNCONSCIOUSNESS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, HEADACHE, AND NUMBNESS OR PAIN IN THE ARMS AND LEGS MAY OCCUR. MAY CAUSE POSSIBLE DEATH BY SKIN CONTACT.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS21900

8052-41-3

STODDARD SOLVENT

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OCCUPATIONAL HEALTH SERVICES, INC.
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NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 8052-41-3
RTECS NUMBER: WJ8925000

SUBSTANCE: STODDARD SOLVENT

TRADE NAMES/SYNONYMS:

DRY CLEANING SAFETY SOLVENT; NAPTHA; SAFETY SOLVENT NAPTHA;
NONANE, MIXTURE WITH TRIMETHYL BENZENE (VARIABLE); VARMOLINE, WHITE SPIRITS;
NAPTHA SAFETY SOLVENT; VARSOL 18; MINERAL SPIRITS 66; NAPHTHA, SOLVENT;
MINERAL SPIRITS; SOLVENT NAPHTHA, STODDARD; SOLVENTS, NAPHTHAS;
MINERAL SPIRITS 66 (ASHLAND); CHARTERSOL 300-66 (CHARTER CHEMICALS);
CHARTERSOL 306 (CHARTER CHEMICALS);
SHELL MINERAL SPIRITS 145 EC (SHELL CHEMICAL CO.);
PAINT THINNER (JASCO CHEMICAL CORP.); MINERAL SPIRITS 75 (UNION);
PL-36 (POLYTECH INC.); VARSOL 1 (EXXON); PAINT THINNER (JASCO CHEMICAL);
OHS21900

CHEMICAL FAMILY:
HYDROCARBON, ALIPHATIC

HYDROCARBON, AROMATIC

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=2 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=2 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: MIXTURE OF PARRAFINIC, NAPHTHENIC, AND PERCENT: 100
AROMATIC HYDROCARBONS

CAS# 8052-41-3

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

STODDARD SOLVENT:

100 PPM (525 MG/M3) OSHA TWA
100 PPM (525 MG/M3) ACGIH TWA
350 MG/M3 NIOSH RECOMMENDED TWA; 1800 MG/M3 NIOSH RECOMMENDED CEILING

MEASUREMENT METHOD: CHARCOAL TUBE; CARBON DISULFIDE; GAS CHROMATOGRAPHY WITH
FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1550).

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A KEROSENE LIKE ODOR.

BOILING POINT: 300-400 F (150-200 C) SPECIFIC GRAVITY: 0.770-0.806

VOLATILITY: 100% VAPOR PRESSURE: 2 MMHG @ 20 C

EVAPORATION RATE: (BUTYL ACETATE=1) 0.1 SOLUBILITY IN WATER: INSOLUBLE

ODOR THRESHOLD: 30 PPM VAPOR DENSITY: 4.8

SOLVENT SOLUBILITY: SOLUBLE IN ABSOLUTE ALCOHOL, BENZENE, ETHER,
CHLOROFORM, CARBON TETRACHLORIDE, CARBON DISULFIDE, OILS; INSOLUBLE IN
CASTOR OIL

VISCOSITY: 0.91-0.95 CENTIPOISES @ 25 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

MODERATE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

FLASH POINT: 100-140 F (38-60 C) UPPER EXPLOSIVE LIMIT: 6%

LOWER EXPLOSIVE LIMIT: 0.9% AUTOIGNITION TEMP.: 440-500 F (230-260 C)

FLAMMABILITY CLASS(OSHA): II

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE
UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM
AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM
VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR
1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE FLOODING AMOUNTS OF WATER AS A FOG, SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS, KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
COMBUSTIBLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: NONE
EXCEPTIONS: 49 CFR 173.118A

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
NAPHTHA-UN 1255

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.203
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 60 L
CARGO AIRCRAFT ONLY: 220 L

TOXICITY

STODDARD SOLVENT:
IRRITATION DATA: 470 PPM/15 MINUTES EYE-HUMAN; 500 MG/24 HOURS EYE-RABBIT

MODERATE; 0.5 ML SKIN-RABBIT IRRITATION (API 33-32723).
 TOXICITY DATA: >5500 MG/M3/4 HOURS INHALATION-RAT LC50; 1700 PPM/7 HOURS
 INHALATION-CAT LCLO; >3 GM/KG SKIN-RABBIT LD50 (API 33-32723);
 >5 GM/KG ORAL-RAT LD50.
 CARCINOGEN STATUS: NONE.
 LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
 ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION; SLIGHTLY TOXIC BY
 DERMAL ABSORPTION AND INGESTION.
 TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT.
 AT INCREASED RISK FROM EXPOSURE: PERSONS WITH A HISTORY OF CHRONIC SKIN OR
 RESPIRATORY DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

STODDARD SOLVENT:

IRRITANT/NARCOTIC/MODERATELY TOXIC.

5000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF LARGE CONCENTRATIONS MAY CAUSE IRRITATION OF THE EYES AND UPPER RESPIRATORY TRACT, NAUSEA, VOMITING, COUGHING, MILD NARCOSIS, AND CENTRAL NERVOUS SYSTEM EFFECTS INCLUDING DIZZINESS, WEAKNESS, AND SLOW, SHALLOW RESPIRATION, PROGRESSING TO PULMONARY EDEMA, BLOODY SPUTUM, AND BRONCHIAL PNEUMONIA. VENTRICULAR FIBRILLATION MAY OCCUR. PNEUMOTHORAX AND EMPHYSEMA MAY COMPLICATE RECOVERY. INHALATION OF VERY HIGH CONCENTRATIONS MAY CAUSE UNCONSCIOUSNESS AND DEATH.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO HIGH CONCENTRATIONS HAS RESULTED IN UPPER RESPIRATORY TRACT IRRITATION, HEADACHE, VERTIGO, FATIGUE, WEIGHT LOSS, NERVOUSNESS, PARESTHESIAS, PERIPHERAL NUMBNESS, PAIN IN THE LIMBS, AND ANEMIA. LIVER AND KIDNEY EFFECTS HAVE BEEN REPORTED, AS HAVE FATAL BONE MARROW HYPOPLASIA, AND INTRACEREBRAL HEMORRHAGE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

STODDARD SOLVENT:

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT WITH THE LIQUID MAY CAUSE IRRITATION WITH DRYING, REDNESS, AND CRACKING DUE TO THE DEFATTING ACTION ON THE SKIN.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DERMATITIS DUE TO THE DEFATTING ACTION ON THE SKIN. TWO CASES HAVE BEEN REPORTED IN WHICH THE LIQUID WAS USED DAILY TO CLEAN HANDS. AFTER <2 YEARS, BOTH CASES PROVED FATAL.

FIRST AID- 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.

EYE CONTACT:

STODDARD SOLVENT:
IRRITANT.

ACUTE EXPOSURE- APPLICATION OF 0.1 ML TO THE EYES OF RABBITS, BOTH WITH AND WITHOUT IMMEDIATE RINSING, RESULTED IN SLIGHT IRRITATION AT ONE HOUR WITH COMPLETE CLEARING AT 24 HOURS. HUMANS EXPOSED TO 470 PPM FOR 15 MINUTES REPORTED EYE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:
STODDARD SOLVENT:
NARCOTIC.

ACUTE EXPOSURE- INGESTION MAY CAUSE IRRITATION OF THE THROAT AND GASTROINTESTINAL TRACT, NAUSEA, VOMITING, COUGHING, AND PULMONARY IRRITATION, PROGRESSING TO PULMONARY EDEMA, BLOODY SPUTUM, AND BRONCHIAL PNEUMONIA WITH FEVER. INGESTION OF >1 ML/KG MAY RESULT IN CENTRAL NERVOUS SYSTEM DEPRESSION WITH DIZZINESS, WEAKNESS, SLOW, SHALLOW RESPIRATION, UNCONSCIOUSNESS, AND CONVULSIONS. VENTRICULAR FIBRILLATION MAY OCCUR. ASPIRATION INTO THE LUNGS MAY OCCUR CAUSING CHEMICAL PNEUMONITIS, PULMONARY EDEMA, HEMORRHAGE, AND POSSIBLY, DEATH. CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- ONLY HYDROCARBONS THAT ARE SOLVENTS FOR A TOXIC AGENT OR ARE THEMSELVES TOXIC NEED TO BE EVACUATED. EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IN PLACE TO PREVENT FURTHER ASPIRATION SHOULD BE DONE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, EMESIS CAN ALSO BE INDUCED USING SYRUP OF IPECAC WITHOUT INCREASING THE HAZARD OF ASPIRATION (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
STODDARD SOLVENT:
ACIDS (STRONG): INCOMPATIBLE.
BASES (STRONG): INCOMPATIBLE.
CHLORINE: VIOLENT REACTION.
NITRIC ACID: VIOLENT REACTION.
OXIDIZERS (STRONG): VIOLENT REACTION.
SULFURIC ACID: VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE IN A COOL, WELL-VENTILATED AREA.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

CONTACT WITH ACIDS, OXIDIZERS, AND OTHER INCOMPATIBILITIES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

STODDARD SOLVENT:

3500 MG/M3: ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.
ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE.

5900 MG/M3: ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE.
ANY CHEMICAL CARTRIDGE RESPIRATOR WITH FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE.

8750 MG/M3: ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.

17,500 MG/M3: ANY SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.
ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.

29,500 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ESCAPE: ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 01/07/85 REVISION DATE: 04/09/92

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STRONTIUM POWDER MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS22070

CAS#: 7440-24-6 FORMULA: SR

STRONTIUM POWDER IS A WHITE TO YELLOW SOLID.

EXPOSURE LIMITS:

NO EXPOSURE LIMITS ESTABLISHED BY OSHA OR ACGIH.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE SEVERE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE BROWNISH SKIN STAINS, PAIN IN THE ARMS AND LEGS, DIZZINESS, FOAMING AT THE MOUTH, DROOLING, STOMACH PAIN, VOMITING BLOOD, DIARRHEA, FEVER, CHOKING, LUNG CONGESTION, DIFFICULTY SPEAKING AND SWALLOWING, BLUISH COLOR OF THE SKIN, LIPS, AND FINGERNAILS, IRREGULAR HEARTBEAT, LOW BLOOD PRESSURE, AND SUFFOCATION.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, INCOORDINATION, WEAKNESS, AND BONE DAMAGE MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ALL WET CLOTHING OR SHOES. WIPE THE SUBSTANCE FROM THE SKIN. WASH EXPOSED PARTS WITH FLOODING AMOUNTS OF WATER AND SOAP. FLUSH EYES WITH FLOODING AMOUNTS OF WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY CATCH FIRE WHEN EXPOSED TO AIR. REACTS WITH WATER TO FORM A FLAMMABLE GAS. MAY REACT DANGEROUSLY WITH ACIDS, OXIDIZERS, AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS22070

7440-24-6

STRONTIUM POWDER

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MATERIAL SAFETY DATA SHEET

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1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-24-6

SUBSTANCE: STRONTIUM, POWDER

TRADE NAMES/SYNONYMS:

STRONTIUM; STRONTIUM ELEMENT; STRONTIUM METAL; SR; OHS22070

CHEMICAL FAMILY:

METAL

MOLECULAR FORMULA: SR

MOLECULAR WEIGHT: 87.62

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=1 PERSISTENCE=1

NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: STRONTIUM
CAS# 7440-24-6

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: SILVER WHITE TO PALE YELLOW METALLIC POWDER.

BOILING POINT: 2523 F (1384 C) MELTING POINT: 1416 F (769 C)

SPECIFIC GRAVITY: 2.6 VAPOR PRESSURE: 10 MMHG @ 898 C

SOLUBILITY IN WATER: REACTS

SOLVENT SOLUBILITY: SOLUBLE IN DILUTE ACIDS, LIQUID AMMONIA, BASES.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MAY IGNITE SPONTANEOUSLY ON EXPOSURE TO AIR.

FIREFIGHTING MEDIA:
DRY CHEMICAL, SODA ASH, LIME OR SAND
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, WITHDRAW FROM AREA AND LET FIRE BURN
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
DO NOT USE WATER OR FOAM. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT
WITHOUT RISK (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 40).

EXTINGUISH USING AGENTS INDICATED. DO NOT GET WATER INSIDE CONTAINERS. AVOID
BREATHING VAPORS FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154
EXCEPTIONS: 49 CFR 173.153

TOXICITY

STRONTIUM, POWDER:
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: POISONING MAY AFFECT THE CARDIOVASCULAR AND RESPIRATORY
SYSTEMS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
STRONTIUM, POWDER:
ACUTE EXPOSURE- ON CONTACT WITH MOISTURE, STRONTIUM RELEASES FLAMMABLE
HYDROGEN GAS AND STRONTIUM HYDROXIDE WHICH IS AN ALKALINE CORROSIVE.
INHALATION OF CORROSIVE SUBSTANCES MAY CAUSE SYMPTOMS OF RESPIRATORY
TRACT IRRITATION POSSIBLY INCLUDING COUGHING, CHOKING, PAIN IN THE
NOSE, MOUTH AND THROAT AND BURNS OF THE MUCOUS MEMBRANES. IF

SUFFICIENT QUANTITIES ARE INHALED, PULMONARY EDEMA MAY DEVELOP, OFTEN WITH A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE TIGHTNESS IN THE CHEST, DYSPNEA, FROTHY SPUTUM, CYANOSIS, AND DIZZINESS. PHYSICAL FINDINGS MAY INCLUDE WEAK, RAPID PULSE, HYPOTENSION, HEMOCONCENTRATION AND MOIST RALES.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED EXPOSURE TO CORROSIVE SUBSTANCES MAY CAUSE INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH AND POSSIBLY BRONCHIAL AND GASTROINTESTINAL DISTURBANCES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

STRONTIUM, POWDER:

ACUTE EXPOSURE- ON CONTACT WITH MOISTURE, STRONTIUM RELEASES FLAMMABLE HYDROGEN GAS AND STRONTIUM HYDROXIDE WHICH IS AN ALKALINE CORROSIVE. DIRECT CONTACT WITH ALKALINE SUBSTANCES MAY CAUSE SEVERE PAIN, BURNS AND POSSIBLY BROWNISH STAINS. THE CORRODED AREAS ARE SOFT, GELATINOUS AND NECROTIC AND THE TISSUE DESTRUCTION MAY BE DEEP.

CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH ALKALINE SUBSTANCES MAY CAUSE DERMATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- 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.

EYE CONTACT:

STRONTIUM, POWDER:

ACUTE EXPOSURE- ON CONTACT WITH MOISTURE, STRONTIUM RELEASES FLAMMABLE HYDROGEN GAS AND STRONTIUM HYDROXIDE WHICH IS AN ALKALINE CORROSIVE. DIRECT CONTACT WITH ALKALINE SUBSTANCES MAY CAUSE PAIN AND BURNS, POSSIBLY SEVERE. THE DEGREE OF INJURY DEPENDS ON THE CONCENTRATION AND DURATION OF CONTACT. THERE MAY BE EDEMA, DESTRUCTION OF EPITHELIUM, CORNEAL OPACIFICATION, AND IRITIS. WHEN DAMAGE IS LESS THAN EXCESSIVE, THESE SYMPTOMS TEND TO AMELIORATE. IN SEVERE BURNS, THE FULL EXTENT OF THE INJURY MAY NOT BE IMMEDIATELY APPARENT. LATE COMPLICATIONS MAY INCLUDE PERSISTENT EDEMA, VASCULARIZATION AND SCARRING OF THE CORNEA, PERMANENT OPACITY, STAPHYLOMA, CATARACT, AND SYMBLEPHARON.

CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH ALKALINE SUBSTANCES MAY RESULT IN CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH 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.

INGESTION:

STRONTIUM, POWDER:

ACUTE EXPOSURE- INGESTION OF STRONTIUM MAY CAUSE GASTROINTESTINAL

DISORDERS, PAINFUL CONTRACTIONS IN THE LIMBS AND POSSIBLY MYOCARDIAL INVOLVEMENT. ON CONTACT WITH MOISTURE, STRONTIUM RELEASES FLAMMABLE HYDROGEN GAS AND STRONTIUM HYDROXIDE WHICH IS AN ALKALINE CORROSIVE. ALKALINE SUBSTANCES MAY CAUSE IMMEDIATE PAIN AND CIRCUMORAL BURNS AND CORROSION OF THE MUCOUS MEMBRANES WHICH AT FIRST TURN WHITE AND SOAPY AND THEN BECOME BROWN, EDEMATOUS AND ULCERATED. THERE MAY BE PROFUSE SALIVATION. SWALLOWING AND SPEECH MAY BE DIFFICULT AT FIRST AND THEN ALMOST IMPOSSIBLE. EVEN WHEN THERE IS NO EVIDENCE OF ORAL BURNS, THE ESOPHAGUS AND STOMACH MAY BE INVOLVED WITH BURNING PAIN, VOMITING AND DIARRHEA. THE VOMITUS MAY BE THICK AND SLIMY WITH MUCUS, AND LATER CONTAIN BLOOD AND SHREDS OF MUCOUS MEMBRANE. EPIGLOTTAL EDEMA MAY RESULT IN RESPIRATORY DISTRESS AND POSSIBLY ASPHYXIA. SHOCK WITH MARKED HYPOTENSION, WEAK AND RAPID PULSE, SHALLOW RESPIRATION, AND CLAMMY SKIN MAY OCCUR. CIRCULATORY COLLAPSE MAY ENSUE AND IF UNCORRECTED, LEAD TO RENAL FAILURE. IN SEVERE CASES, ESOPHAGEAL OR GASTRIC PERFORATION ARE POSSIBLE AND MAY BE ACCOMPANIED BY MEDIASTINITIS, SUBSTERNAL PAIN, PERITONITIS, ABDOMINAL RIGIDITY, AND FEVER. ESOPHAGEAL, AND POSSIBLY GASTRIC OR PYLORIC STRICTURE MAY OCCUR WITHIN A FEW WEEKS, BUT MAY BE DELAYED FOR MONTHS OR EVEN YEARS. DEATH MAY RESULT WITHIN A SHORT TIME FROM ASPHYXIA, CIRCULATORY COLLAPSE, OR ASPIRATION OF EVEN MINUTE AMOUNTS. LATER DEATH MAY BE DUE TO THE COMPLICATIONS OF PERFORATION, PNEUMONIA, OR THE EFFECTS OF STRICTURE FORMATION.

CHRONIC EXPOSURE- ON A DIET HIGH IN STRONTIUM AND LOW IN CALCIUM, YOUNG PIGS DEVELOPED SEVERE BONE DEFORMITIES, INCOORDINATION, WEAKNESS AND HINDLEG PARALYSIS. DEPENDING ON THE CONCENTRATION, REPEATED INGESTION ALKALINE SUBSTANCES MAY RESULT IN INFLAMMATORY AND ULCERATIVE EFFECTS ON THE ORAL MUCOUS MEMBRANES AND OTHER EFFECTS AS WITH ACUTE EXPOSURE.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

MAY IGNITE SPONTANEOUSLY IN AIR. REACTS WITH WATER FORMING FLAMMABLE HYDROGEN GAS. THE HEAT OF THE REACTION MAY BE SUFFICIENT TO IGNITE THE HYDROGEN.

INCOMPATIBILITIES:

STRONTIUM:

ACIDS (CONCENTRATED): VIOLENT REACTION.

BROMINE: IGNITES AT 400 C.

CHLORINE: INCANDESCENT REACTION AT 300 C.

ETHYL ALCOHOL: MAY REACT WITH THE EVOLUTION OF HYDROGEN.

HALOGENS: MAY IGNITE.

MERCURY OXIDE: POSSIBLE EXPLOSION.

METAL SALTS: POSSIBLE EXPLOSION.

OXIDIZERS (STRONG): VIGOROUS REACTION.

SILVER CHLORIDE: POSSIBLE EXPLOSION.

SILVER OXIDE: POSSIBLE EXPLOSION.

DECOMPOSITION:

THEMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE UNDER LIQUID IN THE ABSENCE OF OXYGEN.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR OR IN PRESENCE OF MOISTURE. MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. VIOLENT REACTION WITH WATER PRODUCES FLAMMABLE GAS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT GET WATER ON SPILLED MATERIAL OR INSIDE THE CONTAINER. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE SPILL FOR LATER DISPOSAL. COVER POWDER SPILLS WITH PLASTIC SHEET OR TARP TO MINIMIZE SPREADING. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION

PROOF.

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST, MIST, AND FUME RESPIRATOR.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST, AND FUME FILTER.

ANY 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.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE PIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/02/88 REVISION DATE: 03/27/91

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SULFURIC ACID MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS22350

CAS#: 7664-93-9

FORMULA: H2O4S

UN: UN 1

SULFURIC ACID IS A CLEAR, OILY LIQUID. IF YOU CAN SMELL ACIDIC FUMES OR MIST, YOU MAY BE EXCEEDING THE EXPOSURE LIMIT.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD BY ITSELF; HOWEVER, THE MATERIAL IS AN OXIDIZER. CONTACT WITH FLAMMABLE OR COMBUSTIBLE MATERIALS MAY RESULT IN A FIRE OR EXPLOSION. IN CASE OF SURROUNDING FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE. FOR SMALL FIRES: USE DRY CHEMICAL OR CARBON DIOXIDE. FOR LARGE FIRES: FLOOD AREA WITH WATER FROM A DISTANCE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE BURNS OF THE NOSE, THROAT, MOUTH, STOMACH, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE TEARING, NOSEBLEED, YELLOWISH STAINS AROUND THE MOUTH, THIRST, SNEEZING, COUGHING, WHEEZING, DIFFICULTY BREATHING AND SWALLOWING, LUNG CONGESTION, NAUSEA, VOMITING BLOOD, DIARRHEA, BLOOD IN THE URINE, BLINDNESS, SEIZURES, LUNG DAMAGE, UNCONSCIOUSNESS, AND DEATH BY INHALATION.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES AND DAMAGE TO THE TEETH MAY OCCUR. MAY CAUSE TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ALL WET CLOTHING OR SHOES. WIPE THE SUBSTANCE FROM THE SKIN. WASH EXPOSED PARTS WITH FLOODING AMOUNTS OF WATER AND SOAP. FLUSH EYES WITH FLOODING AMOUNTS OF WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT DANGEROUSLY WITH WATER WITH THE GENERATION OF MUCH HEAT. CONTACT WITH FLAMMABLE OR COMBUSTIBLE MATERIALS MAY RESULT IN A FIRE OR EXPLOSION. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SPILL OR LEAK:

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. DO NOT GET WATER INSIDE CONTAINER. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT PUT WATER ON LEAK OR SPILL AREA. CLEAN UP ONLY UNDER THE SUPERVISION OF AN EXPERT. DIKE SPILL FOR LATER DISPOSAL. DO NOT APPLY WATER UNLESS DIRECTED TO DO SO. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

CERCLA REPORTABLE QUANTITY: 1000 POUND(S).

SARA REPORTABLE QUANTITY: 1000 POUND(S).

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS22350

7664-93-9

SULFURIC ACID

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OHS22350

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7664-93-9
RTECS NUMBER: WS5600000

SUBSTANCE: SULFURIC ACID

TRADE NAMES/SYNONYMS:

OIL OF VITRIOL; BOV; DIPPING ACID; VITRIOL BROWN OIL; HYDROGEN SULFATE;
NORDHADSEN ACID; DIHYDROGEN SULFATE; SULPHURIC ACID; MATTING ACID;
DITHIONIC ACID; SULFURIC ACID 66 BAUME (COLLIER CARBON & CHEMICAL CORP.);
OIL OF VITRIOL BATTERY ACID (SPECTRUM CHEMICAL MFG. CORP.); STCC 4930040;
UN 1830; H2O4S; OHS22350

CHEMICAL FAMILY:
INORGANIC ACID

MOLECULAR FORMULA: H2-S-O4

MOLECULAR WEIGHT: 98.07

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=2 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: SULFURIC ACID
CAS# 7664-93-9

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

SULFURIC ACID:

- 1 MG/M3 OSHA TWA
- 1 MG/M3 ACGIH TWA; 3 MG/M3 ACGIH STEL
- 1 MG/M3 NIOSH RECOMMENDED TWA
- 1 MG/M3 DFG MAK TWA;
- 2 MG/M3 DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE; SODIUM BICARBONATE/SODIUM CARBONATE;
ION CHROMATOGRAPHY; (NIOSH VOL. III # 7903, INORGANIC ACIDS).

1000 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
1000 POUNDS SARA SECTION 304 REPORTABLE QUANTITY

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: ODORLESS, CLEAR, COLORLESS TO YELLOW TO DARK BROWN DENSE
HYGROSCOPIC OILY LIQUID WITH A MARKED ACID TASTE WHEN PURE.

BOILING POINT: 626 F (330 C) MELTING POINT: 50 F (10 C)

SPECIFIC GRAVITY: 1.84 VAPOR PRESSURE: <0.001 @ 20 C PH: <3

SOLUBILITY IN WATER: SOLUBLE ODOR THRESHOLD: >1 MG/M3 (MIST)

VAPOR DENSITY: 3.4

SOLVENT SOLUBILITY: DECOMPOSES IN ALCOHOL.

@ 340 C IT DECOMPOSES INTO SULFUR TRIOXIDE AND WATER

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLEGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR
OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER.
CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS
MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:
DRY CHEMICAL OR CARBON DIOXIDE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
DO NOT GET WATER INSIDE CONTAINER. DO NOT GET SOLID STREAM OF WATER ON
SPILLED MATERIAL. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK.
APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL
WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS (1990 EMERGENCY RESPONSE
GUIDEBOOK, DOT P 5800.5 GUIDE PAGE 39).

EXTINGUISH USING AGENTS INDICATED; DO NOT USE WATER DIRECTLY ON MATERIAL.
IF LARGE AMOUNTS OF COMBUSTIBLE MATERIALS ARE INVOLVED, USE WATER SPRAY
OR FOG IN FLOODING AMOUNTS. USE WATER SPRAY TO ABSORB CORROSIVE VAPORS.
COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS
POSSIBLE. AVOID BREATHING CORROSIVE VAPORS; KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.272
EXCEPTIONS: 49 CFR 173.244

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
SULFURIC ACID-UN 1830

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
8 - CORROSIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
CORROSIVE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 1 L
CARGO AIRCRAFT ONLY: 30 L

TOXICITY

SULFURIC ACID:
IRRITATION DATA: 1380 UG EYE-RABBIT SEVERE; 5 MG/30 SECONDS RINSED EYE-RABBIT
SEVERE.
TOXICITY DATA: 3 MG/M3/24 WEEKS INHALATION-HUMAN TCLO; 510 MG/M3/2 HOURS
INHALATION-RAT LC50; 320 MG/M3/2 HOURS INHALATION-MOUSE LC50; 18 MG/M3

INHALATION-GUINEA PIG LC50; 2140 MG/KG ORAL-RAT LD50; 135 MG/KG UNREPORTED-MAN LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: NONE. AN EPIDEMIOLOGICAL STUDY OF WORKERS AT A REFINERY AND CHEMICAL PLANT SUGGESTS AN INCREASED RISK OF LARYNGEAL CANCER FROM EXPOSURE TO HIGH CONCENTRATIONS OF SULFURIC ACID.

LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE AND INGESTION.

ACUTE TOXICITY LEVEL: HIGHLY TOXIC BY INHALATION; MODERATELY TOXIC BY INGESTION.

TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

SULFURIC ACID:

CORROSIVE/HIGHLY TOXIC. 80 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF MISTS MAY CAUSE MUCOUS MEMBRANE IRRITATION PRINCIPALLY AFFECTING THE RESPIRATORY TRACT EPITHELIUM. LOW CONCENTRATIONS, 0.35-5 MG/M3, MAY CAUSE INCREASED PULMONARY AIR FLOW RESISTANCE AND SUBSEQUENT SHALLOWER AND MORE RAPID BREATHING. HOT CONCENTRATED MISTS MAY CAUSE RAPID LOSS OF CONSCIOUSNESS WITH POSSIBLE DAMAGE TO LUNG TISSUE. VAPORS MAY CAUSE NASAL SECRETIONS, SNEEZING, A BURNING OR TICKLING SENSATION IN THE NOSE AND THROAT AND RETROSTERNAL REGION, FOLLOWED BY COUGH, RESPIRATORY DISTRESS, TRACHEOBRONCHITIS, CHEMICAL PNEUMONITIS AND POSSIBLE SPASM OF THE VOCAL CORDS. HIGH CONCENTRATIONS MAY PRODUCE BLOODY NASAL SECRETIONS AND SPUTUM, HEMATEMESIS GASTRITIS, AND PULMONARY EDEMA. A SINGLE OVEREXPOSURE MAY LEAD TO LARYNGEAL, TRACHEOBRONCHIAL AND PULMONARY EDEMA. ONE INDIVIDUAL SPRAYED IN THE FACE WITH SULFURIC ACID LIQUID EXPERIENCED DELAYED SYMPTOMS OF PULMONARY FIBROSIS, RESIDUAL BRONCHITIS, AND PULMONARY EMPHYSEMA. VAPORS FROM DILUTE SOLUTIONS MAY IRRITATE MUCOUS MEMBRANES. THE LETHAL DOSE REPORTED IN RATS IS 510 MG/M3/2 HOURS.

CHRONIC EXPOSURE- REPEATED EXPOSURE TO THE MIST MAY CAUSE INFLAMMATION OF THE UPPER RESPIRATORY TRACT, CHRONIC BRONCHITIS AND ETCHING OF THE DENTAL ENAMEL. THE CENTRAL AND LATERAL INCISORS ARE PRIMARILY AFFECTED. REPEATED EXCESSIVE EXPOSURE OVER LONG PERIODS OF TIME HAVE RESULTED IN BRONCHITIC SYMPTOMS, RHINORRHEA, FREQUENT RESPIRATORY TRACT INFECTIONS, EMPHYSEMA, STOMATITIS AND DIGESTIVE DISTURBANCES. CHRONIC INHALATION MAY CAUSE ALKALINE DEPLETION OF THE BODY PRODUCING AN ACIDOSIS WHICH AFFECTS THE NERVOUS SYSTEM AND PRODUCES AGITATION, HESITANT GAIT AND GENERALIZED WEAKNESS. AN EPIDEMIOLOGICAL STUDY OF WORKERS AT A REFINERY AND CHEMICAL PLANT SUGGESTS AN INCREASED RISK OF LARYNGEAL CANCER FROM EXPOSURE TO HIGH CONCENTRATIONS OF SULFURIC ACID. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
SULFURIC ACID:
CORROSIVE.

ACUTE EXPOSURE- CONTACT WITH CONCENTRATED SULFURIC ACID MAY CAUSE SEVERE SECOND AND THIRD DEGREE SKIN BURNS WITH NECROSIS DUE TO ITS AFFINITY FOR WATER AND SUBSEQUENT SEVERE DEHYDRATING ACTION, AND ITS EXOTHERMIC REACTION WITH MOISTURE. POSSIBLE CHARRING MAY OCCUR LEADING TO SHOCK AND COLLAPSE DEPENDING ON THE AMOUNT OF TISSUE INVOLVED. THE RESULTING WOUNDS MAY BE LONG IN HEALING AND MAY CAUSE EXTENSIVE SCARRING THAT MAY RESULT IN FUNCTIONAL INHIBITION. CONTACT WITH DILUTE SOLUTIONS MAY CAUSE SKIN IRRITATION.

CHRONIC EXPOSURE- REPEATED CONTACT WITH LOW CONCENTRATIONS MAY CAUSE SKIN DESICCATION AND ULCERATION OF THE HANDS, AND PANARIS OR CHRONIC PURULENT INFLAMMATION AROUND THE NAILS. REPEATED CONTACT WITH DILUTE SOLUTIONS MAY CAUSE DERMATITIS.

FIRST AID- 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 (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
SULFURIC ACID:
CORROSIVE.

ACUTE EXPOSURE- EXPOSURE TO THE VAPORS MAY CAUSE A BURNING OR STINGING SENSATION IN THE EYES WITH LACRIMATION, BLURRED VISION AND CONJUNCTIVAL CONGESTION. SPLASHES OF ACID IN THE EYES MAY PRODUCE DEEP CORNEAL ULCERATION, KERATO-CONJUNCTIVITIS AND PALPEBRAL LESIONS WITH SEVERE SEQUELAE. IRREPARABLE CORNEAL DAMAGE AND BLINDNESS AS WELL AS SCARRING OF THE EYELIDS MAY OCCUR. SEVERE SULFURIC ACID EYE BURNS HAVE INCLUDED GLAUCOMA AND CATARACT AS COMPLICATIONS IN THE MOST SEVERE CASES. CONTACT WITH DILUTED ACID MAY PRODUCE MORE TRANSIENT EFFECTS FROM WHICH RECOVERY MAY BE COMPLETE.

CHRONIC EXPOSURE- REPEATED EXPOSURE MAY RESULT IN LACRIMATION AND CHRONIC CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
SULFURIC ACID:
CORROSIVE.

ACUTE EXPOSURE- INGESTION MAY CAUSE BURNING PAIN IN THE MOUTH, THROAT, ESOPHAGUS AND ABDOMEN, A SOUR TASTE AND NAUSEA FOLLOWED BY VOMITING AND DIARRHEA OF CHARRED BLACK STOMACH CONTENTS. DEHYDRATION AND CARBONIZATION OF TISSUE MAY OCCUR WITH ESCHARS ON THE LIPS AND MOUTH. BROWNISH OR YELLOWISH STAINS MAY BE FOUND AROUND THE MOUTH, INTENSE THIRST, DIFFICULT SWALLOWING, ACIDEMIA, STOMATITIS, RAPID AND WEAK PULSE, SHALLOW BREATHING, SHOCK AND POSSIBLE CONVULSIONS AND DEATH MAY OCCUR. ALBUMIN, BLOOD AND CASTS IN URINE, ANURIA, ESOPHAGEAL AND DELAYED

GASTRIC STENOSIS HAS BEEN REPORTED. POSSIBLE PERFORATION OF THE GASTROINTESTINAL TRACT MAY RESULT IN PERITONITIS.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS, ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
SULFURIC ACID:
VIOLENT EXOTHERMIC REACTION WITH WATER.

INCOMPATIBILITIES:
SULFURIC ACID:

ACETALDEHYDE: VIOLENTLY POLYMERIZED BY CONCENTRATED ACID.
ACETIC ANHYDRIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ACETONE + NITRIC ACID: VIOLENT DECOMPOSITION.
ACETONE + POTASSIUM DICHROMATE: IGNITION.
ACETONE CYANHYDRIN: PRESSURE INCREASE WITH POSSIBLE EXPLOSIVE RUPTURE OF VESSEL.
ACETONITRILE: VIOLENT EXOTHERM ON HEATING; SULFUR TRIOXIDE REDUCES INITIATION TEMPERATURE.
ACROLEIN: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ACRYLONITRILE: VIGOROUS EXOTHERMIC POLYMERIZATION.
ALCOHOL: EXOTHERMIC REACTION AND CONTRACTION OF VOLUME.
ALCOHOLS AND HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.
ALLYL ALCOHOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ALLYL CHLORIDE: VIOLENT POLYMERIZATION.
ALKYL NITRATES: MAY CAUSE VIOLENT REACTION.
2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
AMMONIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
AMMONIUM IRON(III) SULFATE DODECAHYDRATE: VIOLENT, EXOTHERMIC REACTION ON HEATING.
AMMONIUM TRIPERCHROMATE: FIRE OR EXPLOSION HAZARD.
ANILINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
BASES: VIOLENT REACTION.
BENZYL ALCOHOL: MAY DECOMPOSES EXPLOSIVELY AT ABOUT 180 C.
BROMATES + METALS: POSSIBLE IGNITION.
BROMINE PENTAFLUORIDE: VIOLENT REACTION WITH POSSIBLE IGNITION.
TERT-BUTYL-M-XYLENE: VIOLENT EXOTHERMIC REACTION WITHOUT AGITATION.
N-BUTYRALDEHYDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
CARBIDES: HAZARDOUS MIXTURE.
CESIUM ACETYLIDE: IGNITION ON CONTACT.
1-CHLORO-2,3-EPOXYPROPANE: VIOLENT INTERACTION.

4-CHLORONITROBENZENE AND SULFUR TRIOXIDE: POSSIBLE EXPLOSIVE REACTION.
 CHLORATES: ALL CHLORATES, WHEN BROUGHT IN CONTACT WITH SULFURIC ACID MAY
 GIVE OFF EXPLOSIVE CHLORINE DIOXIDE GAS. A VIOLENT EXPLOSION IS USUAL.
 CHLORATES + METALS: POSSIBLE IGNITION.
 CHLORINE TRIFLUORIDE: VIOLENT REACTION.
 CHLOROSULFONIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 CHROMATES: FIRE AND EXPLOSION HAZARD.
 COATINGS: ATTACKED.
 COMBUSTIBLE MATERIALS (FINELY DIVIDED): MAY IGNITE.
 COPPER: EVOLUTION OF SULFUR DIOXIDE.
 CUPROUS NITRIDE: VIOLENT REACTION.
 2-CYANO-4-NITROBENZENEDIAZONIUM HYDROGEN SULFATE: EXOTHERMIC REACTION.
 2-CYANO-2-PROPANOL: VIOLENT REACTION WITH INCREASE IN PRESSURE.
 CYCLOPENTADIENE: VIOLENT OR EXPLOSIVE REACTION.
 CYCLOPENTANONE OXIME: VIOLENT REACTION.
 1,3-DIAZIDOBENZENE: IGNITION FOLLOWED BY EXPLOSIVE REACTION.
 DIETHYLAMINE: EXOTHERMIC REACTION.
 DIISOBUTYLENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 DIMETHYLBENZYL CARBINOL + HYDROGEN PEROXIDE: EXPLODES.
 DIMETHOXYANTHRAQUINONE: EXOTHERMIC REACTION ABOVE 150 C.
 4-DIMETHYLAMINO BENZALDEHYDE: EXOTHERMIC REACTION.
 2,5-DINITRO-3-METHYLBENZOIC ACID + SODIUM AZIDE: EXPLOSIVE REACTION.
 1,5-DINITRONAPHTHALENE + SULFUR: EXOTHERMIC REACTION.
 EPICHLOROHYDRIN: VIOLENT REACTION.
 ETHOXYLATED NONYLPHENOL: POSSIBLE IGNITION.
 ETHANOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.
 ETHYLENE CYANOHYDRIN: VIOLENT REACTION.
 ETHYLENE DIAMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 ETHYLENE GLYCOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 ETHYLENIMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 FULMINATES: EXTREMELY HAZARDOUS MIXTURE.
 HEXALITHIUM DISILICIDE: INCANDESCENT REACTION.
 HYDROCHLORIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 HYDROGEN PEROXIDE (>50%): EXPLOSIVE REACTION AFTER EVAPORATION.
 HYDROFLUORIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 INDANE + NITRIC ACID: POSSIBLE EXPLOSION.
 IODINE HEPTAFLUORIDE: THE ACID BECOMES EFFERVESCENT.
 IRON: POSSIBLE EXPLOSION DUE TO HYDROGEN GAS FROM THE ACID-METAL REACTION.
 ISOPRENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 LITHIUM SILICIDE: INCANDESCENT REACTION.
 MERCURY NITRIDE: EXPLOSION ON CONTACT.
 MESITYL OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
 METALS: MAY LIBERATE FLAMMABLE HYDROGEN GAS.
 METALS (POWDERED): EXTREMELY HAZARDOUS MIXTURE.
 METAL ACETYLIDES: IGNITION REACTION.
 METAL CHLORATES: VIOLENT EXPLOSION UNLESS PROPERLY COOLED.
 METAL PERCHLORATES: FORMATION OF EXPLOSIVE PERCHLORIC ACID.
 4-METHYLPYRIDINE: EXOTHERMIC REACTION.
 NITRAMIDE: MAY DECOMPOSE EXPLOSIVELY ON CONTACT.
 NITRATES: INCOMPATIBLE.
 NITRIC ACID + GLYCERIDES: EXPLOSION.
 NITRIC ACID + ORGANIC MATERIAL: MAY CAUSE VIOLENT REACTION.
 NITRIC ACID + TOLUENE: POSSIBLE VIOLENT REACTION OR EXPLOSION.
 NITROARYL BASES AND DERIVATIVES: MAY CAUSE VIOLENT REACTION OR EXPLOSION.

NITROBENZENE: EXOTHERMIC REACTION AT ELEVATED TEMPERATURES.
3-NITROBENZENESULFONIC ACID: EXOTHERMIC REACTION.
NITROMETHANE: FORMATION OF EXPLOSIVE MIXTURE.
N-NITROMETHYLAMINE: EXPLOSIVE DECOMPOSITION.
4-NITROTOLUENE: EXPLOSIVE AT 80 C.
ORGANICS: VIOLENT EXOTHERMIC REACTION.
PENTASILVER TRIHYDROXYDIAMIDOPHOSPHATE: EXPLOSION ON CONTACT.
PERCHLORATES: POSSIBLE EXPLOSION.
PERCHLORIC ACID: FORMATION OF DANGEROUS ANHYDROUS PERCHLORIC ACID.
PERMANGANATES: FORMATION OF PERMANGANIC ACID.
PERMANGANATES + BENZENE: POSSIBLE EXPLOSION.
1-PHENYL-2-METHYL-PROPYL ALCOHOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.
PHOSPHORUS (WHITE OR YELLOW): IGNITION IN CONTACT WITH BOILING ACID.
PHOSPHORUS ISOCYANATE: VIOLENT REACTION.
PHOSPHORUS TRIOXIDE: VIOLENT OXIDATION WITH POSSIBLE IGNITION.
PICRATES: EXTREMELY HAZARDOUS MIXTURE.
PLASTICS: ATTACKED.
POLYSILYLENE: EXPLOSION ON CONTACT.
POTASSIUM: EXPLOSIVE INTERACTION.
POTASSIUM TERT-BUTOXIDE: IGNITION.
POTASSIUM CHLORATE: POSSIBLE FIRE AND EXPLOSION.
POTASSIUM PERMANGANATE: POSSIBLE EXPLOSION IN THE PRESENCE OF MOISTURE.
POTASSIUM PERMANGANATE + POTASSIUM CHLORIDE: VIOLENT EXPLOSION.
PROPIOLACTONE (BETA): TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
PROPYLENE OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
3-PROPYNOL: POSSIBLE EXPLOSION UNLESS ADEQUATELY COOLED.
PYRIDINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
REDUCING AGENTS: REACTS.
RUBBER: ATTACKED.
RUBIDIUM ACETYLIDE: IGNITION ON CONTACT.
SILVER PERMANGANATE (MOIST): EXPLOSIVE REACTION.
SILVER PEROXOCHROMATE: EXPLOSIVE REACTION.
SODIUM: EXPLOSIVE REACTION WITH AQUEOUS ACID.
SODIUM CARBONATE: VIOLENT REACTION.
SODIUM CHLORATE: POSSIBLE FIRE OR EXPLOSION.
SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
SODIUM TETRAHYDROBORATE: VIOLENT, EXOTHERMIC REACTION.
SODIUM THIOCYANATE: VIOLENT EXOTHERMIC WITH EVOLUTION OF CARBONYL SULFIDE.
STEEL: POSSIBLE EXPLOSION DUE TO HYDROGEN GAS FROM THE ACID-METAL REACTION.
STYRENE MONOMER: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
SUCROSE: FORMATION OF CARBON MONOXIDE.
TETRAMETHYLBENZENES: VIOLENT REACTION IN CLOSED CONTAINERS.
1,2,4,5-TETRAZINE: VIOLENT DECOMPOSITION ON CONTACT.
THALLIUM(I) AZIDIDITHIOCARBONATE: MAY EXPLODE ON CONTACT.
1,3,5-TRINITROSOHEXAHYDRO-1,3,5-TRIAZINE: EXPLOSIVE DECOMPOSITION ON CONTACT.
VINYL ACETATE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.
ZINC CHLORATE: LIKELY TO CAUSE FIRES AND EXPLOSIONS.
ZINC IODIDE: VIOLENT INTERACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC OXIDES OF SULFUR.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN COOL, DRY, WELL-VENTILATED LOCATION. SEPARATE FROM COMBUSTIBLES AND OTHER REACTIVE MATERIALS. SEPARATE FROM CARBIDES, CHLORATES, FULMINATES, NITRATES, PICRATES, AND POWDERED METALS. (NFPA 49, HAZARDOUS CHEMICALS DATA, 1991).

AVOID DIRECT SUNLIGHT.

STORE IN A TIGHTLY CLOSED CONTAINER.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). VIOLENT REACTION WITH WATER. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN CONFINED SPACES. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT AND LATER DISPOSAL.

WATER SPILL:

NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM BICARBONATE.

OCCUPATIONAL SPILL:

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. DO NOT GET WATER INSIDE CONTAINER. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT PUT WATER ON LEAK OR SPILL AREA. CLEAN UP ONLY UNDER THE SUPERVISION OF AN EXPERT. DIKE SPILL FOR LATER DISPOSAL. DO NOT APPLY WATER UNLESS DIRECTED TO DO SO. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

SULFURIC ACID:

25 MG/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH AN ACID GAS CARTRIDGE(S) AND HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

50 MG/M3- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ACID GAS CARTRIDGE(S) IN COMBINATION WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ACID GAS CANISTER HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.

80 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A 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 ACID GAS CANISTER HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

WEAR APPROPRIATE PROTECTIVE CLOTHING TO AVOID ANY POSSIBILITY OF SKIN CONTACT WITH LIQUIDS CONTAINING MORE THAN 1% SULFURIC ACID. AVOID REPEATED OR PROLONGED SKIN CONTACT WITH LIQUIDS CONTAINING 1% OR LESS SULFURIC ACID.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 11/28/84 REVISION DATE: 04/17/92

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TIN MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS23480

CAS#: 7440-31-5 FORMULA: SN

TIN IS AN ODORLESS, SILVER-WHITE , LUSTROUS METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST OR FUMES MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES, THIRST, A METALLIC TASTE IN THE MOUTH, CHILLS, FEVER HEADACHE, COUGHING, MUSCULAR PAIN, NAUSEA, VOMITING, SWEATING, DIARRHEA, AND WEAKNESS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES, AND LUNG DAMAGE MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS23480

7440-31-5

TIN

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OHS23480

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-31-5
RTECS NUMBER: XP7320000

SUBSTANCE: TIN

TRADE NAMES/SYNONYMS:

METALLIC TIN; SILVER MATT POWDER; TIN FLAKE; TIN POWDER; WANG; TIN ELEMENT;
STANNUM; C.I. 77860; C.I. PIGMENT METAL 5;
T-121,T-122,T-123,T-124,T-127,T-128,T-129,T-130; SN; OHS23480

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: SN

MOLECULAR WEIGHT: 118.69

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: TIN
CAS# 7440-31-5

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

TIN AND INORGANIC TIN COMPOUNDS (AS SN):

2 MG/M3 OSHA TWA
2 MG/M3 ACGIH TWA
2 MG/M3 NIOSH RECOMMENDED TWA
2 MG/M3 DFG MAK TWA (TOTAL DUST);
4 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; ACID, ATOMIC ABSORPTION
SPECTROMETRY; (NIOSH VOL. I(3) # S183).

PHYSICAL DATA

DESCRIPTION: AN ODORLESS, SILVER-WHITE, LUSTROUS METAL.

BOILING POINT: 4100 F (2260 C) MELTING POINT: 450 F (232 C)

SPECIFIC GRAVITY: 7.28 VAPOR PRESSURE: 1 MMHG @ 1610 C

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN HYDROCHLORIC ACID, SULFURIC ACID, AQUA REGIA, HOT POTASSIUM HYDROXIDE, ALKALIES; SLIGHTLY SOLUBLE IN DILUTE NITRIC ACID, ACETIC ACID.

AUTOIGNITION TEMPERATURE: 806 F (430 C) (LAYER); 1166 F (630 C) (CLOUD)

BRINNELL HARDNESS: 2.9

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

LOWER EXPLOSIVE LIMIT: 0.19 OZ/FT3

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154

EXCEPTIONS: 49 CFR 173.153

TOXICITY

TIN:
TOXICITY DATA: TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: NO DATA AVAILABLE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

TIN:

400 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF INORGANIC TIN COMPOUNDS MAY CAUSE RESPIRATORY IRRITATION. METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED METAL OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA, AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO DUST OR FUMES MAY CAUSE A BENIGN PNEUMOCONIOSIS WITHOUT FIBROSIS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

TIN:

ACUTE EXPOSURE- NO REPORTED EFFECTS IN HUMANS FROM TIN DUST. INORGANIC TIN COMPOUNDS MAY CAUSE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH INORGANIC TIN COMPOUNDS MAY CAUSE DERMATITIS.

FIRST AID- 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.

EYE CONTACT:

TIN:

ACUTE EXPOSURE- POWDER MAY CAUSE MODERATE IRRITATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO INORGANIC TIN COMPOUNDS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

TIN:

ACUTE EXPOSURE- RELATIVELY NON-TOXIC BECAUSE OF POOR ABSORPTION. AT VERY HIGH LEVELS, ABDOMINAL PAIN, NAUSEA, VOMITING, GASTRIC IRRITATION, AND DIARRHEA MAY OCCUR.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION OF SMALL QUANTITIES MAY CAUSE ABDOMINAL PAIN, NAUSEA, CONSTIPATION, AND LOSS OF WEIGHT.

FIRST AID- CHEMICAL SHOULD BE REMOVED BY EMESIS. DO NOT INDUCE VOMITING IN AN UNCONSCIOUS PERSON. TREATMENT SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION. (DREISBACH HANDBOOK OF POISONING 11 ED.)

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

TIN:

AMMONIUM NITRATE: FORMS SHOCK-SENSITIVE MIXTURE.

BROMINE (EXCEPT IN HALOCARBON SOLUTION): VIOLENT REACTION.

BROMINE TRIFLUORIDE: VIOLENT REACTION.

CARBON TETRACHLORIDE + WATER: VIOLENT REACTION.

CHLORINE (LIQUID): IGNITES @ -34 C.

CHLORINE TRIFLUORIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

COPRIC NITRATE: POSSIBLE IGNITION.

DISULFUR DICHLORIDE: VIOLENT REACTION.

FLUORINE: IGNITES @ 100 C.

IODINE BROMIDE: VIOLENT REACTION.

IODINE HEPTAFLUORIDE: VIGOROUS EXOTHERMIC REACTION WHEN HEATED.

POTASSIUM PEROXIDE: INCANDESCENT REACTION.

SODIUM PEROXIDE: INCANDESCENT REACTION.

SODIUM PEROXIDE + CARBON DIOXIDE: EXPLODES.

SULFUR: IGNITION REACTION.

TELLURIUM: VIGOROUS EXOTHERMIC REACTION.

TURPENTINE: FIRE AND EXPLOSION HAZARD.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE STANNIC OXIDE.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

TIN, INORGANIC COMPOUNDS EXCEPT OXIDES (AS SN):

FOR DUST OR MIST:

10 MG/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE RESPIRATORS.

20 MG/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND QUARTER-MASK RESPIRATORS.

50 MG/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.

FOR DUST, MIST, OR FUME:

20 MG/M3- ANY SUPPLIED-AIR RESPIRATOR.

ANY SELF-CONTAINED BREATHING APPARATUS.

50 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

100 MG/M3- 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.

400 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 12/17/84 REVISION DATE: 04/12/91

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TOLUENE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS23590

CAS#: 108-88-3 FORMULA: C7H8

TOLUENE IS A CLEAR LIQUID WITH A PLEASANT ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 40 F (4 C). DANGEROUS FIRE HAZARD. VAPOR-AIR MIXTURES MAY BE EXPLOSIVE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, AND SKIN AND SEVERE IRRITATION OF THE EYES. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, TEARING, BLURRED VISION, WEAKNESS, CONFUSION, HEADACHE, DILATED PUPILS, NAUSEA, VOMITING, DIARRHEA, SLEEPINESS, NUMBNESS, SEIZURES, LUNG CONGESTION, IRREGULAR HEARTBEAT, UNCONSCIOUSNESS, AND POSSIBLE DEATH. DRINKING ALCOHOL MAY WORSEN THE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE EYES AND NERVE DAMAGE MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS23590
108-88-3
TOLUENE

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OHS23590

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 108-88-3
RTECS NUMBER: XS5250000

SUBSTANCE: TOLUENE

TRADE NAMES/SYNONYMS:

BENZENE, METHYL-; METHYLBENZENE; 1-METHYLBENZENE; METHYLBENZOL;
PHENYLMETHANE; METHANE, PHENYL-; METHACIDE; TOLUOL;
AMSCO SOLV 1410, TOLUENE (UNION OIL COMPANY);
DIAPHRAGM REPAIR KIT SOLVENT FOR HL29 & M8-M9 KITS (3M);
POLYSTYRENE Q-DOPE THINNER 104102 & 10-4104; PRINT COAT SOLVENT 13-2;
O-DOPE THINNER (GC ELECTRONICS); TAFA SPRAY GUARD SP (TAFA INC); RCRA U220;
STCC 4909305; UN 1294; C7H8; OHS23590

CHEMICAL FAMILY:
HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C6-H5-C-H3

MOLECULAR WEIGHT: 92.14

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: TOLUENE
CAS# 108-88-3

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

TOLUENE:

100 PPM (377 MG/M3) OSHA TWA; 150 PPM (565 MG/M3) OSHA STEL
100 PPM (377 MG/M3) ACGIH TWA; 150 PPM (565 MG/M3) ACGIH STEL
(NOTICE OF INTENDED CHANGES 1991-92)
100 PPM (377 MG/M3) NIOSH RECOMMENDED TWA;
150 PPM (565 MG/M3) NIOSH RECOMMENDED STEL
100 PPM (377 MG/M3) DFG MAK TWA;
500 PPM (1885 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 2 TIMES/SHIFT

MEASUREMENT METHOD: CHARCOAL TUBE; CARBON DISULFIDE; GAS CHROMATOGRAPHY WITH

FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1500, HYDROCARBONS).

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (JANUARY 1, 1991)

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH AN AROMATIC ODOR.

BOILING POINT: 231 F (111 C) MELTING POINT: -139 F (-95 C)

SPECIFIC GRAVITY: 0.8669 VOLATILITY: 100% VAPOR PRESSURE: 22 MMHG @ 20 C

EVAPORATION RATE: (BUTYL ACETATE=1) 2.24 SOLUBILITY IN WATER: 0.05% @ 20 C

ODOR THRESHOLD: 10-15 PPM VAPOR DENSITY: 3.14

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, BENZENE, CHLOROFORM,
LIGROIN, GLACIAL ACETIC ACID, CARBON DISULFIDE, ACETONE.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY
GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FLASH POINT: 40 F (4 C) (CC) UPPER EXPLOSIVE LIMIT: 7.1%

LOWER EXPLOSIVE LIMIT: 1.2% AUTOIGNITION TEMP.: 896 F (480 C)

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE

UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING QUANTITIES AS FOG, SOLID STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991)

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.119
EXCEPTIONS: 49 CFR 173.118

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
TOLUENE-UN 1294

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

TOLUENE:

IRRITATION DATA: 300 PPM EYE-HUMAN; 870 UG EYE-RABBIT MILD; 2 MG/24 HOURS EYE-RABBIT SEVERE; 100 MG/30 SECONDS RINSED EYE-RABBIT MILD; 435 MG SKIN-RABBIT MILD; 500 MG SKIN-RABBIT MODERATE; 20 MG/24 HOURS SKIN-RABBIT MODERATE.

TOXICITY DATA: 200 PPM INHALATION-HUMAN TCLO; 100 PPM INHALATION-MAN TCLO; >26,700 PPM/1 HOUR INHALATION-RAT LC50; 400 PPM/24 HOURS INHALATION-MOUSE LC50; 55,000 PPM/40 MINUTES INHALATION-RABBIT LCLO; 1600 PPM INHALATION-GUINEA PIG LCLO; 12,124 MG/KG SKIN-RABBIT LD50; 50 MG/KG ORAL-HUMAN LDLO; 636 MG/KG ORAL-RAT LD50; 2250 MG/KG SUBCUTANEOUS-MOUSE LD50; 1960 MG/KG INTRAVENOUS-RAT LD50; 130 MG/KG INTRAVENOUS-RABBIT LDLO; 500 MG/KG INTRAPERITONEAL-GUINEA PIG LD50; 1332 MG/KG INTRAPERITONEAL-RAT LD50; 59 MG/KG INTRAPERITONEAL-MOUSE LD50; 1750 MG/KG INTRAPERITONEAL-MAMMAL LDLO; 6900 MG/KG UNREPORTED-RAT LD50; 2000 MG/KG UNREPORTED-MOUSE LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL INADEQUATE EVIDENCE (IARC GROUP-3).

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION; SLIGHTLY TOXIC BY INHALATION AND DERMAL ABSORPTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; NEUROTOXIN. POISONING MAY ALSO AFFECT THE HEART, LIVER, KIDNEYS, AND BLOOD.

ADDITIONAL DATA: STIMULANTS SUCH AS EPINEPHRINE MAY INDUCE VENTRICULAR FIBRILLATION. ALCOHOL MAY ENHANCE THE TOXIC EFFECTS. THE METABOLISM OF OTHER SOLVENTS MAY BE INHIBITED RESULTING IN A POTENTIATION OF TOXIC EFFECTS OF THOSE CHEMICALS. UPTAKE IS DIRECTLY PROPORTIONAL TO THE AMOUNT OF BODY FAT. BLOOD LEVELS MAY BE CUMULATIVE WHEN EXPOSURE IS EXTENDED.

HEALTH EFFECTS AND FIRST AID

INHALATION:

TOLUENE:

IRRITANT/NARCOTIC/NEUROTOXIN.

2000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- ODOR DETECTION MAY BE INSUFFICIENT FOR WARNING DUE TO OLFACTORY FATIGUE. EXPOSURE TO 100 PPM MAY CAUSE IRRITATION. 200-600 PPM FOR UP TO 8 HOURS CAUSED FATIGUE, WEAKNESS, CONFUSION, HEADACHE, NAUSEA, IMPAIRED COORDINATION AND REACTION TIME, PARESTHESIAS OF THE SKIN, EUPHORIA, DIZZINESS, AND DILATED PUPILS. 800 PPM CAUSED RAPID IRRITATION, NASAL MUCOUS SECRETION, METALLIC TASTE, DROWSINESS, AND IMPAIRED BALANCE. AFTEREFFECTS INCLUDING NERVOUSNESS, MUSCULAR FATIGUE, AND INSOMNIA LASTED FOR SEVERAL DAYS. A WORKER FOUND UNCONSCIOUS AFTER EXPOSURE TO HIGH VAPOR CONCENTRATIONS FOR 18 HOURS DEVELOPED HEPATIC AND RENAL DAMAGE WITH MYOGLOBINURIA. RECOVERY WAS COMPLETE WITHIN 6 MONTHS. HEMATOLOGIC EFFECTS OCCUR RARELY WITH EXPOSURE TO HIGH CONCENTRATIONS. DEATH MAY BE DUE TO

RESPIRATORY FAILURE OR VENTRICULAR FIBRILLATION.

CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE MAY CAUSE MUCOUS MEMBRANE IRRITATION, VOMITING, INSOMNIA, NOSEBLEEDS, CHEST PAINS, EUPHORIA, HEADACHE, VERTIGO, NAUSEA, ANOREXIA, MOMENTARY LOSS OF MEMORY, LOSS OF COORDINATION AND IMPAIRMENT OF REACTION TIME, TINNITUS, IMPAIRED SPEECH, VISION, AND/OR HEARING, ALCOHOL INTOLERANCE, AND PETECHIAE AND ABNORMAL BLEEDING. BONE MARROW HYPOPLASIA AND LEUKOPENIA HAVE BEEN REPORTED OCCASIONALLY, BUT MAY BE DUE TO BENZENE CONTAMINATION. EXAMINATION OF WORKERS EXPOSED TO 100-1100 PPM REVEALED HEPATOMEGALY, MILD MACROCYTOSIS, MODERATE ERYTHROPENIA, AND ABSOLUTE LYMPHOCYTOSIS BUT NO LEUKOPENIA. OTHER WORKERS EXPOSED TO TOLUENE FUMES DEVELOPED LEUKOPENIA AND ESPECIALLY NEUTROPENIA. WITHIN 6 MONTHS, THEY SHOWED DECREASED PROTHROMBIN LEVEL AND INCREASED COAGULATION TIME. PERIODONTAL EFFECTS WERE ALSO NOTED. VOLUNTEERS EXPOSED TO 200 PPM FOR 6 HOURS/DAY FOR 2 DAYS SHOWED A SIGNIFICANT INCREASE IN HEART RATE. CARDIAC SENSITIZATION MAY OCCUR AND MAY RESULT IN CARDIAC ARREST DUE TO VENTRICULAR FIBRILLATION. REPEATED INHALATION TO THE POINT OF EUPHORIA HAS CAUSED IRREVERSIBLE ENCEPHALOPATHY WITH CEREBELLAR ATAXIA, RHYTHMIC LIMB MOVEMENTS, DISEQUILIBRIUM, BIZARRE BEHAVIOR, EMOTIONAL LABILITY, OPTIC ATROPHY, AND DIFFUSE CEREBRAL ATROPHY. OTHER NEUROPSYCHIATRIC EFFECTS MAY INCLUDE DIZZINESS, SYNCOPE, PARESTHESIAS, PERIPHERAL NEUROPATHY, HALLUCINATIONS, LETHARGY, AND COMA. INTENTIONAL SNIFFING CAN PRODUCE RENAL TUBULAR DEFECTS WITH METABOLIC ACIDOSIS, ELECTROLYTE ABNORMALITIES AND POTASSIUM LOSS. SEVERE MUSCLE WEAKNESS LEADING TO LIMB PARALYSIS AND CARDIAC ARRHYTHMIAS MAY RESULT FROM THE HYPOKALEMIA; HOWEVER, SENSORY FUNCTION AND TENDON REFLEXES ARE NOT IMPAIRED. GASTROINTESTINAL EFFECTS MAY INCLUDE ABDOMINAL PAIN, NAUSEA, VOMITING, AND HEMATEMESIS. CHROMOSOME CHANGES WERE OBSERVED IN SOME WORKERS UP TO TWO YEARS AFTER CESSATION OF EXPOSURE TO TOLUENE. WOMEN OCCUPATIONALLY EXPOSED TO TOLUENE AND OTHER VARNISH SOLVENTS HAVE REPORTED MENSTRUAL DISORDERS, UNDERWEIGHT OFFSPRING WHO DID NOT NURSE WELL, AND FETAL ASPHYXIA. ONE CASE STUDY INDICATED TOLUENE APPARENTLY CROSSED THE PLACENTA AND CREATED CEREBELLAR DAMAGE IN AN UNBORN INFANT. DYSMENORRHEA HAS BEEN REPORTED IN WOMEN OCCUPATIONALLY EXPOSED TO TOLUENE LEVELS OF 60-100 PPM. REPRODUCTIVE EFFECTS HAVE ALSO BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:**TOLUENE:****IRRITANT.**

ACUTE EXPOSURE- CONTACT WITH THE LIQUID MAY CAUSE IRRITATION. VAPORS MAY CAUSE DRYING. SKIN ABSORPTION DOES OCCUR, BUT IT IS GENERALLY TOO SLOW TO PRODUCE SIGNS OF ACUTE SYSTEMIC TOXICITY.

CHRONIC EXPOSURE- PROLONGED OR REPEATED CONTACT WITH THE LIQUID MAY CAUSE DEFATTING OF THE SKIN WITH A DRY FISSURED DERMATITIS. REPEATED APPLICATION TO RABBIT SKIN PRODUCED SLIGHT TO MODERATE IRRITATION AND SLIGHT NECROSIS. TOPICAL APPLICATION OF 10 GM/KG PRODUCED AN INCREASE IN PLASMIC AND LYMPHOID RETICULAR CELLS IN BONE MARROW OF RATS, WHILE 1 GM/KG HAD NO EFFECT.

FIRST AID- 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.

EYE CONTACT:

TOLUENE:

IRRITANT.

ACUTE EXPOSURE- LIQUID MAY CAUSE IRRITATION AND CORNEAL BURNS IF NOT PROMPTLY REMOVED. CONCENTRATIONS AROUND 300-800 PPM MAY CAUSE NOTICEABLE IRRITATION AND LACRIMATION. CORNEAL LESIONS AND VERY FINE VACUOLES HAVE BEEN REPORTED IN WORKERS EXPOSED TO A SOLVENT CONTAINING TOLUENE. THE LESIONS SUBSIDED FOLLOWING SEVERAL DAYS OF NON-EXPOSURE. SIMILAR LESIONS HAVE BEEN PRODUCED IN CATS FOLLOWING EXPOSURE TO TOLUENE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

TOLUENE:

NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE A BURNING SENSATION IN THE EPIGASTRIUM AND ABDOMINAL SPASMS. SYSTEMIC EFFECTS MAY OCCUR AS DESCRIBED IN ACUTE INHALATION. ASPIRATION OF THE LIQUID INTO THE LUNGS MAY CAUSE COUGHING, GAGGING, DISTRESS, ACUTE HEMORRHAGIC PNEUMONITIS, AND RAPIDLY DEVELOPING PULMONARY EDEMA. THE APPROXIMATE LETHAL DOSE IN HUMANS IS 15-30 ML.

CHRONIC EXPOSURE- NO EFFECTS WERE REPORTED IN RATS FED UP TO 590 MG/KG/DAY FOR 193 DAYS. ADMINISTRATION TO ANIMALS DURING GESTATION PRODUCED SIGNIFICANT EMBRYOLETHALITY AND AN INCREASE IN CLEFT PALATE IN OFFSPRING.

FIRST AID- EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IN PLACE TO PREVENT FURTHER ASPIRATION SHOULD BE DONE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, EMESIS CAN ALSO BE INDUCED USING SYRUP OF IPECAC WITHOUT INCREASING THE HAZARD OF ASPIRATION (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

TOLUENE:

ALLYL CHLORIDE + DICHLOROETHYL ALUMINUM OR ETHYLALUMINUM SESQUICHLORIDE:
POSSIBLE EXPLOSION.

BROMINE TRIFLUORIDE (SOLID): VIOLENT REACTION.

1,3-DICHLORO-5,5-DIMETHYL-2,4-IMIDAZOLIDIDIONE: EXPLOSIVE REACTION.

DINITROGEN TETRAFLUORIDE: FORMS EXPLOSIVE MIXTURE.

NITRIC ACID: VIGOROUS REACTION.

NITRIC ACID + SULFURIC ACID: VIOLENT DECOMPOSITION POSSIBLE.

NITROGEN TETROXIDE: EXPLOSIVE REACTION.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

PLASTICS, RUBBER, AND COATINGS: MAY BE ATTACKED.

SILVER PERCHLORATE: FORMS SHOCK-SENSITIVE MIXTURE.

SULFUR DICHLORIDE: VIOLENT REACTION, GREATLY ACCELERATED IN THE PRESENCE OF
IRON OR FERRIC CHLORIDE.

SULFURIC ACID: EXOTHERMIC REACTION.

TETRANITROMETHANE: FORMS EXPLOSIVE MIXTURE.

URANIUM HEXAFLUORIDE: VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL
TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING
OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE
ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

PROTECT AGAINST PHYSICAL DAMAGE. OUTSIDE OR DETACHED STORAGE IS PREFERABLE.
INSIDE STORAGE SHOULD BE IN A STANDARD FLAMMABLE LIQUIDS STORAGE ROOM OR
CABINET. SEPARATE FROM OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS
DATA, 1975).

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH
MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS
WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983,
RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO

GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U220.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE IN HEAT OF FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

IMMOBILIZE SPILL WITH UNIVERSAL GELLING AGENT.

REDUCE VAPOR AND FIRE HAZARD WITH APPROPRIATE FOAM.

AIR SPILL:

KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:

IF MATERIAL DISSOLVED, APPLY ACTIVATED CARBON. USE DREDGES OR LIFTS TO EXTRACT MASSES OF POLLUTION AND PRECIPITATES. APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL. LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS. USE SOAPS, DETERGENTS, ALCOHOLS OR OTHER SURFACE ACTIVE AGENT TO THICKEN SPILLED MATERIAL. USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE

METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

TOLUENE:

1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
 ANY SUPPLIED-AIR RESPIRATOR.
 ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
 ANY SELF-CONTAINED BREATHING APPARATUS.

2000 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.
 ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
 ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
 ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE, FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.

ESCAPE- 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.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 10/25/84 REVISION DATE: 02/25/92

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METHYL CHLOROFORM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS14370

CAS#: 71-55-6

FORMULA: C2H3CL3

METHYL CHLOROFORM IS A CLEAR LIQUID WITH A MILD ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

SLIGHT FIRE HAZARD. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, HEADACHE, NAUSEA, VOMITING, STOMACH PAIN, DIARRHEA, SEIZURES, LIVER AND KIDNEY DAMAGE, UNCONSCIOUSNESS, HEART ATTACK, AND POSSIBLE DEATH.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN AND EYES MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS14370

71-55-6

METHYL CHLOROFORM

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OHS14370

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 71-55-6
RTECS NUMBER: KJ2975000

SUBSTANCE: METHYL CHLOROFORM

TRADE NAMES/SYNONYMS:

~~1,1,1-TRICHLOROETHANE~~; ALPHA-TRICHLOROETHANE; AEROTHENE TT;
METHYLTRICHLOROMETHANE; METHYLCHLOROFORM; TRICHLOROMETHYLMETHANE;
TRICHLOROETHANE; ETHANE, 1,1,1-TRICHLORO-; CHLORTEN; NACCOLENE;
TRICHLOROETHANE 111 DEGREASE COLD/VAPOR (ASHLAND);
ST-1000A CLEANER (STRESSCOAT); BLACO-THANE (BARON-BLAKESLEE);
PERM ETHANE DG (DETREX CHEMICALS); SAFETY SOLVENT (LOCTITE CORPORATION);
ACTIVATOR 711, 702, 703 (LOCTITE CORPORATION); STCC 4941176; RCRA U226;
UN 2831; C2H3CL3; OHS14370

CHEMICAL FAMILY:
HALOGEN COMPOUND, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-CL3

MOLECULAR WEIGHT: 133.40

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=1 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=1 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: METHYL CHLOROFORM
CAS# 71-55-6

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

350 PPM (1910 MG/M3) OSHA TWA; 450 PPM (2460 MG/M3) OSHA STEL
350 PPM (1910 MG/M3) ACGIH TWA; 450 PPM (2460 MG/M3) ACGIH STEL
350 PPM (1910 MG/M3) NIOSH RECOMMENDED 15 MINUTE CEILING
200 PPM (1080 MG/M3) DFG MAK TWA;
1000 PPM (5400 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 2 TIMES/SHIFT

MEASUREMENT METHOD: CHARCOAL TUBE; CARBON DISULFIDE; GAS CHROMATOGRAPHY WITH
FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1003, HALOGENATED

HYDROCARBONS).

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS LIQUID WITH A MILD CHLOROFORM-LIKE ODOR.

BOILING POINT: 165 F (74 C) MELTING POINT: -26 F (-32 C)

SPECIFIC GRAVITY: 1.3390 VAPOR PRESSURE: 100 MMHG @ 20 C

EVAPORATION RATE: (BUTYL ACETATE=1) 5.0 SOLUBILITY IN WATER: 0.078% @ 25 C

ODOR THRESHOLD: 44-100 PPM VAPOR DENSITY: 4.55

SOLVENT SOLUBILITY: SOLUBLE IN ACETONE, BENZENE, CHLOROFORM, METHANOL,
ETHANOL, CARBON DISULFIDE, ETHER, CARBON TETRACHLORIDE, N-HEPTANE.

VISCOSITY: 0.858 CPS @ 20 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

UPPER EXPLOSIVE LIMIT: 12.5% LOWER EXPLOSIVE LIMIT: 7.5%

AUTOIGNITION TEMP.: 998 F (537 C)

FIREFIGHTING MEDIA:

DRY CHEMICAL OR CARBON DIOXIDE

(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM

(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 74).

EXTINGUISH USING AGENTS FOR SURROUNDING FIRE. COOL FIRE-EXPOSED CONTAINERS WITH FLOODING AMOUNTS OF WATER APPLIED FROM AS FAR A DISTANCE AS POSSIBLE. DO NOT ALLOW RUN-OFF WATER INTO SEWERS AND WATER SOURCES. AVOID BREATHING VAPORS.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
ORM-A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.605
EXCEPTIONS: 49 CFR 173.505

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
1,1,1-TRICHLOROETHANE-UN 2831

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U. S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
KEEP AWAY FROM FOOD

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.153
NON-BULK PACKAGING: 49 CFR 173.203
BULK PACKAGING: 49 CFR 173.241

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 60 L
CARGO AIRCRAFT ONLY: 220 L

TOXICITY

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):
IRRITATION DATA: 450 PPM/8 HOURS EYE-MAN; 5 GM/12 DAYS INTERMITTENT
SKIN-RABBIT MILD; 20 MG/24 HOURS SKIN-RABBIT MODERATE;
100 MG EYE-RABBIT MILD; 2 MG/24 HOURS EYE-RABBIT SEVERE.
TOXICITY DATA: 27 GM/M3/10 MINUTES INHALATION-MAN LCLO;
350 PPM INHALATION-MAN TCLO; 200 PPM/4 HOURS INHALATION-MAN TCLO;
920 PPM/70 MINUTES INHALATION-HUMAN TCLO; 18000 PPM/4 HOURS INHALATION-RAT
LC50; 3911 PPM/2 HOURS INHALATION-MOUSE LC50; 24400 MG/M3 INHALATION-CAT
LC50; 15800 MG/KG SKIN-RABBIT LD50 (EPA-600/8-82-003F, 1984); >5 GM/KG
SKIN-RABBIT LD50; 670 MG/KG ORAL-HUMAN TDLO; 10300 MG/KG ORAL-RAT LD50;

11240 MG/KG ORAL-MOUSE LD50; 5660 MG/KG ORAL-RABBIT LD50;
 9470 MG/KG ORAL-GUINEA PIG LD50; 750 MG/KG ORAL-DOG LD50;
 16 GM/KG SUBCUTANEOUS-MOUSE LD50; 500 MG/KG SUBCUTANEOUS-RABBIT LD50;
 95 MG/KG INTRAVENOUS-DOG LD50; 3593 MG/KG INTRAPERITONEAL-RAT LD50;
 3636 MG/KG INTRAPERITONEAL-MOUSE LD50; 3100 MG/KG INTRAPERITONEAL-DOG LD50;
 MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
 CARCINOGEN STATUS: ANIMAL INADEQUATE EVIDENCE (IARC GROUP-3).
 LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
 ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INHALATION, DERMAL ABSORPTION AND
 INGESTION.
 TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY ALSO AFFECT
 THE HEART, LIVER AND KIDNEYS.
 AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN DISORDERS,
 LIVER DISEASE OR CARDIOVASCULAR DISEASE.
 ADDITIONAL DATA: ALCOHOL MAY ENHANCE THE TOXIC EFFECTS. STIMULANTS SUCH
 AS EPINEPHRINE MAY INDUCE VENTRICULAR FIBRILLATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

IRRITANT/NARCOTIC. 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- EXPOSURE TO 500 PPM FOR 60 MINUTES SHOULD CAUSE NO EFFECT
 EXCEPT FOR A DISTINCTIVE ODOR WHILE 900-1000 PPM FOR 20 MINUTES MAY CAUSE
 MILD RESPIRATORY TRACT IRRITATION AND PROMPT BUT MINIMAL IMPAIRMENT OF
 EQUILIBRIUM WHICH MAY BE ACCOMPANIED BY HEADACHE, LASSITUDE AND ATAXIA.
 IMPAIRED PERFORMANCE OF BEHAVIORAL TESTS WAS ALSO REPORTED AT 1000 PPM.
 HIGHER LEVELS OF 2000-5000 PPM MAY CAUSE INCOORDINATION, ANESTHESIA,
 EUPHORIA, LOSS OF CONSCIOUSNESS, COMA AND DEATH DUE TO CENTRAL NERVOUS
 SYSTEM DEPRESSION, RESPIRATORY ARREST, OR CARDIAC ARRHYTHMIA.

CARDIAC SENSITIZATION MAY BE A CONTRIBUTING FACTOR. OTHER EFFECTS MAY
 INCLUDE NAUSEA, VOMITING, DIARRHEA, DROWSINESS, CONVULSIONS, FALL OF BLOOD
 PRESSURE, LIVER AND KIDNEY DAMAGE, BRADYCARDIA AND BLOOD CLOTTING CHANGES.

CHRONIC EXPOSURE- NO ADVERSE EFFECTS RELATED TO EXPOSURE WERE REPORTED IN
 VOLUNTEERS EXPOSED TO 500 PPM FOR 7 HOURS A DAY FOR 5 DAYS, OR IN
 WORKERS EXPOSED TO 200 PPM FOR SEVERAL MONTHS TO 6 YEARS. THERE IS SOME
 EVIDENCE FROM HUMAN CASE REPORTS THAT REPEATED EXPOSURE TO HIGH
 CONCENTRATIONS MAY CAUSE LASTING DAMAGE TO THE HEART. EXPOSURE OF
 ANIMALS FOR 3 MONTHS AT CONCENTRATIONS FROM 1000 TO 10,000 PPM CAUSED
 SYMPTOMS OF CENTRAL NERVOUS SYSTEM DEPRESSION AND SOME PATHOLOGICAL
 CHANGES IN THE LIVERS AND LUNGS OF SOME SPECIES. REPRODUCTIVE EFFECTS
 HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR 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. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN
 SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION
 IMMEDIATELY.

SKIN CONTACT:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION AND REDNESS. VAPORS ARE POORLY ABSORBED, BUT THE LIQUID, ESPECIALLY IF CONFINED UNDER AN IMPERMEABLE BARRIER MAY BE ABSORBED TO SOME EXTENT. THIS ALONE IS UNLIKELY TO RESULT IN TOXIC EFFECTS, BUT MAY ADD TO THE EFFECTS OF INHALATION EXPOSURE.

CHRONIC EXPOSURE- REPEATED SKIN CONTACT MAY PRODUCE A DRY, SCALY, FISSURED DERMATITIS DUE TO THE DEFATTING PROPERTIES OF THE LIQUID, AND POSSIBLY BURNS.

FIRST AID- 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.

EYE CONTACT:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

IRRITANT.

ACUTE EXPOSURE- EXPOSURE TO 500 PPM MAY CAUSE IRRITATION AND REDNESS.

DIRECT CONTACT WITH THE LIQUID MAY CAUSE TEMPORARY INJURY WITH COMPLETE RECOVERY EXPECTED IN 48 HOURS. DIRECT APPLICATION TO THE EYES OF RABBITS HAS CAUSED CONJUNCTIVAL IRRITATION, BUT NO CORNEAL DAMAGE.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH 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.

INGESTION:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE NAUSEA, VOMITING, DIARRHEA, GASTROINTESTINAL DISTURBANCES AND ABDOMINAL PAIN FOLLOWED BY CENTRAL NERVOUS SYSTEM DEPRESSION WITH HEADACHE, DIZZINESS, WEAKNESS, INCOORDINATION, MENTAL CONFUSION AND UNCONSCIOUSNESS. DEATH MAY OCCUR FROM CHRONIC RESPIRATORY FAILURE. OTHER SYMPTOMS AS DESCRIBED IN ACUTE INHALATION MAY ALSO OCCUR. MYOCARDIAL SENSITIZATION TO EPINEPHRINE AND SUBSEQUENT DEATH DUE TO CARDIAC ARREST MAY OCCUR. ASPIRATION MAY RESULT IN PULMONARY EDEMA OR CHEMICAL PNEUMONITIS.

CHRONIC EXPOSURE- REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC (KEEPING THE HEAD BELOW THE HIPS TO PREVENT ASPIRATION), FOLLOWED BY WATER. REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

SLOWLY DECOMPOSES OVER TIME YIELDING HYDROGEN CHLORIDE. AN INHIBITOR MAY BE ADDED TO SCAVENGE THE ACID THAT IS FORMED AND PREVENT CORROSION TO METALS. WATER MAY REACT WITH THE INHIBITOR AND ALLOW THE NATURAL DECOMPOSITION TO OCCUR.

INCOMPATIBILITIES:

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE).

ACETONE: EXOTHERMIC REACTION.

ALKALI (STRONG): POSSIBLE VIOLENT REACTION.

ALUMINUM AND ALLOYS: MAY DECOMPOSE VIOLENTLY.

BARIUM: FIRE AND EXPLOSION HAZARD.

MAGNESIUM: VIOLENT DECOMPOSITION WITH EVOLUTION OF HYDROGEN CHLORIDE.

METALS (POWDERED): FIRE AND EXPLOSION HAZARD.

NITROGEN TETROXIDE: FORMS EXPLOSIVE MIXTURE.

OXIDIZERS (STRONG): POSSIBLE VIOLENT REACTION.

OXYGEN (GAS): POSSIBLE EXPLOSION WHEN HEATED @ 100 C.

OXYGEN (LIQUID): POSSIBLE VIOLENT EXPLOSION.

POTASH: FORMS FLAMMABLE OR EXPLOSIVE PRODUCT.

POTASSIUM AND ALLOYS: FORMS SHOCK-SENSITIVE MIXTURE.

POTASSIUM HYDROXIDE: FORMATION OF SPONTANEOUSLY FLAMMABLE PRODUCT.

RUBBER, PLASTICS, COATINGS: MAY BE ATTACKED.

SODIUM AND ALLOYS: FIRE AND EXPLOSION HAZARD.

SODIUM HYDROXIDE: FORMS SPONTANEOUSLY FLAMMABLE PRODUCT.

SODIUM-POTASSIUM ALLOY: POSSIBLE EXPLOSION.

TIN AND ALLOYS: INCOMPATIBLE.

ZINC AND ALLOYS: INCOMPATIBLE.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND CORROSIVE FUMES OF CHLORIDES, TOXIC FUMES OF PHOSGENE AND CHLOROACETYLENES, AND OXIDES OF CARBON.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U226.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINER MAY EXPLODE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

WATER SPILL:

LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

TRAP SPILLED MATERIAL AT BOTTOM IN DEEP WATER POCKETS, EXCAVATED HOLDING AREAS OR WITHIN SAND BAG BARRIERS.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

METHYL CHLOROFORM (1,1,1-TRICHLOROETHANE):

1000 PPM- ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

ESCAPE- 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.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 10/25/84 REVISION DATE: 02/25/92

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TRICHLOROETHYLENE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS23850

CAS#: 79-01-6

FORMULA: C₂HCL₃

TRICHLOROETHYLENE IS A COLORLESS LIQUID WITH A SWEET ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

SLIGHT FIRE HAZARD. DO NOT SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

FOR SMALL FIRES: USE DRY CHEMICAL, CARBON DIOXIDE OR HALON.

FOR LARGE FIRES: USE WATER SPRAY, FOG OR REGULAR FOAM.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES WITH TEARING AND BLURRED VISION. ADDITIONAL EFFECTS MAY INCLUDE ALLERGIC REACTIONS, DRUNKENNESS, BURNING SENSATION OF THE MOUTH, THROAT, AND STOMACH, HEADACHE, NAUSEA, VOMITING, DIARRHEA, STOMACH CRAMPS, MENTAL EFFECTS, HALLUCINATIONS, EYE INJURY, SWEATING, BLUISH COLOR OF THE SKIN, LIPS, AND FINGERNAILS, LOW BLOOD PRESSURE, NUMBNESS, TWITCHING, SEIZURES, SPLEEN AND NERVE DAMAGE, HEART ATTACK, AND UNCONSCIOUSNESS.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN, SWELLING OF THE EYES, FACE, AND HANDS, YELLOW SKIN AND EYE COLOR, MUSCLE PAIN, IRREGULAR HEARTBEAT, WHEEZING, DOUBLE VISION, BLINDNESS, BLOOD, SKIN, LIVER, AND KIDNEY EFFECTS, AND BRAIN DAMAGE MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS AND TUMORS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

NORMALLY STABLE IN AN ENCLOSED CONTAINER. MAY REACT WITH HEAT OR LIGHT PRODUCING A DANGEROUS GAS IF UNINHIBITED. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SPILL OR LEAK:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY.

CERCLA REPORTABLE QUANTITY: 100 POUND(S).

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE

MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS23850
79-01-6
TRICHLOROETHYLENE

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OHS23850

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 79-01-6
RTECS NUMBER: KX4550000

SUBSTANCE: TRICHLOROETHYLENE

TRADE NAMES/SYNONYMS:

ACETYLENE TRICHLORIDE; ETHYLENE TRICHLORIDE; ALGYLEN;
1-CHLORO-2,2-DICHLOROETHYLENE; 1,1-DICHLORO-2-CHLOROETHYLENE; TCE; ANAMETH;
ETHINYL TRICHLORIDE; TRICHLOROETHENE; 1,1,2-TRICHLOROETHYLENE;
ETHYLENE, TRICHLORO-; CHLORYLEN; 1,1,2-TRICHLOROETHENE; ETHENE, TRICHLORO-;
NEU-TRI (R) SOLVENT (DOW CHEMICAL); BLACO-TRI (BARON-BLAKESLEE); UN 1710;
RCRA U228; STCC 4941171; C2HCL3; OHS23850

CHEMICAL FAMILY:
HALOGEN COMPOUND, ALIPHATIC

MOLECULAR FORMULA: CL-C-H-C-CL2

MOLECULAR WEIGHT: 131.39

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=1 REACTIVITY=0 PERSISTENCE=3

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=1 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: TRICHLOROETHYLENE
CAS# 79-01-6

PERCENT: >99

OTHER CONTAMINANTS: TRACES OF AMINES OR EPOXIDES AS INHIBITORS.

EXPOSURE LIMITS:

TRICHLOROETHYLENE:

50 PPM (269 MG/M3) OSHA TWA; 200 PPM (1070 MG/M3) OSHA STEL
50 PPM (269 MG/M3) ACGIH TWA; 200 PPM (1070 MG/M3) ACGIH STEL
25 PPM (134 MG/M3) NIOSH RECOMMENDED TWA
50 PPM (269 MG/M3) DFG MAK TWA;
250 PPM (1344 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 2 TIMES/SHIFT

MEASUREMENT METHOD: CHARCOAL TUBE; CARBON DISULFIDE; GAS CHROMATOGRAPHY WITH
FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1022).

100 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (APRIL 1, 1988)

PHYSICAL DATA

DESCRIPTION: COLORLESS LIQUID WITH A MILD CHLOROFORM-LIKE ODOR.

BOILING POINT: 189 F (87 C) MELTING POINT: -99 F (-73 C)

SPECIFIC GRAVITY: 1.4642 VAPOR PRESSURE: 58 MMHG @ 20 C

EVAPORATION RATE: (CARBON TETRACHLORIDE=1) 0.69 SOLUBILITY IN WATER: 0.1%

ODOR THRESHOLD: 21 PPM VAPOR DENSITY: 4.53

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, ACETONE, CHLOROFORM,
BENZENE AND VEGETABLE OILS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

UPPER EXPLOSIVE LIMIT: 52% @ 100 C LOWER EXPLOSIVE LIMIT: 7.8% @ 100 C

AUTOIGNITION TEMP.: 770 F (410 C)

FIREFIGHTING MEDIA:
DRY CHEMICAL OR CARBON DIOXIDE
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL
WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. ISOLATE FOR 1/2 MILE IN
ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990
EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 74).

USE AGENT SUITABLE FOR TYPE OF FIRE. AVOID BREATHING TOXIC VAPORS, KEEP
UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
ORM-A

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:

NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.605
EXCEPTIONS: 49 CFR 173.505

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
TRICHLOROETHYLENE-UN 1710

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
KEEP AWAY FROM FOOD

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.153
NON-BULK PACKAGING: 49 CFR 173.203
BULK PACKAGING: 49 CFR 173.241

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 60 L
CARGO AIRCRAFT ONLY: 220 L

TOXICITY

TRICHLOROETHYLENE:
IRRITATION DATA: 2 MG/24 HOURS SKIN-RABBIT SEVERE; 20 MG/24 HOURS
EYE-RABBIT MODERATE.
TOXICITY DATA: 6900 MG/M3/10 MINUTES INHALATION-HUMAN TCLO; 160 PPM/83 MINUTES
INHALATION-HUMAN TCLO; 812 MG/KG INHALATION-HUMAN TDLO; 110 PPM/8 HOURS
INHALATION-MAN TCLO; 2900 PPM INHALATION-MAN LCLO; 8000 PPM/4 HOURS
INHALATION-RAT LCLO; 8450 PPM/4 HOURS INHALATION-MOUSE LC50; 11,000 PPM
INHALATION-RABBIT LCLO; 32,500 MG/M3/2 HOURS INHALATION-CAT LCLO;
37,200 PPM/40 MINUTES INHALATION-GUINEA PIG LCLO; 7 GM/KG ORAL-HUMAN LDLO;
2143 MG/KG ORAL-MAN TDLO; 2402 MG/KG ORAL-MOUSE LD50; 7330 MG/KG
ORAL-RABBIT LDLO; 5864 MG/KG ORAL-CAT LDLO; 16 GM/KG
SUBCUTANEOUS-MOUSE LD50; 1800 MG/KG SUBCUTANEOUS-RABBIT LDLO; 150 MG/KG
SUBCUTANEOUS-DOG LDLO; 33,900 UG/KG INTRAVENOUS-MOUSE LD50; 150 MG/KG
INTRAVENOUS-DOG LDLO; 1282 MG/KG INTRAPERITONEAL-RAT LD50; 1900 MG/KG
INTRAPERITONEAL-DOG LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA

(RTECS); TUMORIGENIC DATA (RTECS).
 CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL LIMITED EVIDENCE (IARC GROUP-3). REPEATED ORAL ADMINISTRATION PRODUCED HEPATOCELLULAR CARCINOMAS IN MALE AND FEMALE MICE; HEPATOCELLULAR ADENOMAS IN FEMALE MICE; LUNG TUMORS IN MALE AND FEMALE MICE; TUBULAR CELL NEOPLASMS OF THE KIDNEY AND INTERSTITIAL CELL NEOPLASMS OF THE TESTIS IN RATS. INHALATION EXPOSURES RESULTED IN INCREASED INCIDENCES OF LIVER AND LUNG TUMORS IN MALE AND FEMALE MICE AND LOW INCIDENCES OF ADENOCARCINOMAS OF THE RENAL TUBULES IN RATS.
 LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
 ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION. SLIGHTLY TOXIC BY INHALATION.
 TARGET EFFECTS: SENSITIZER- DERMAL; CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE LIVER, KIDNEYS, LUNG AND HEART.
 AT INCREASED RISK FROM EXPOSURE: PERSON WITH PRE-EXISTING HEART DISEASE.
 ADDITIONAL DATA: THE PRESENCE OF TETRACHLOROETHANE AS AN IMPURITY, OR THE CONSUMPTION OF ALCOHOLIC BEVERAGES, CAFFEINE, OR OTHER DRUGS MAY ENHANCE THE SYSTEMIC TOXICITY. EPINEPHRINE OR OTHER STIMULANTS MAY INDUCE VENTRICULAR ARRHYTHMIAS. MAY CROSS THE PLACENTA. ONE STUDY SHOWS AN INCREASED RISK OF LEUKEMIA FOR CHILDREN WHOSE FATHERS HAD OCCUPATIONAL EXPOSURE TO CHLORINATED SOLVENTS AFTER THE BIRTH OF THE CHILD.

HEALTH EFFECTS AND FIRST AID

INHALATION:

TRICHLOROETHYLENE:

IRRITANT/NARCOTIC.

1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- MAY CAUSE MILD IRRITATION OF THE RESPIRATORY TRACT. LEVELS OF 250-1000 PPM HAVE CAUSED IMPAIRED JUDGEMENT AND COORDINATION.

1000-5000 PPM HAS CAUSED EXCITATION FOLLOWED BY CENTRAL NERVOUS SYSTEM DEPRESSION WITH DROWSINESS, DIZZINESS, HEADACHE, NAUSEA, VOMITING, UNCONSCIOUSNESS AND COMA. IF CONSCIOUSNESS IS REGAINED, NAUSEA AND VOMITING MAY FOLLOW FOR SEVERAL HOURS. PSYCHOTIC EFFECTS MAY INCLUDE EUPHORIA, DISORIENTATION, VISUAL DISTURBANCES AND HALLUCINATIONS, AND DELUSIONS. OTHER EFFECTS MAY INCLUDE WEAKNESS, ABDOMINAL CRAMPS, PALLOR, DYSPNEA, TACHYPNEA, IRREGULAR PULSE AND HEARTBEAT, PULMONARY EDEMA, HYPOTENSION, ANESTHESIA, TREMORS, PROFUSE PERSPIRATION, CYANOSIS, AND RARELY CONVULSIONS. DEATH MAY OCCUR FROM RESPIRATORY ARREST OR VENTRICULAR FIBRILLATION RESULTING IN PRIMARY CARDIAC FAILURE. LIVER AND KIDNEY DAMAGE MAY ALSO OCCUR. ANIMAL STUDIES HAVE ALSO SHOWN SPLEEN DAMAGE. TRIGEMINAL NERVE DAMAGE AND HEPATOTOXIC EFFECTS HAVE BEEN ATTRIBUTED TO EXPOSURE TO THE IMPURE SUBSTANCE OR TO THE DECOMPOSITION PRODUCTS.

CHRONIC EXPOSURE: REPEATED EXPOSURE TO LEVELS BELOW 300 PPM MAY CAUSE NAUSEA, VOMITING, HEADACHE, ABDOMINAL CRAMPS, SLEEPINESS, DRUNKENNESS, FLUSHING, ANOREXIA, SWELLING OF THE EYES, FACE AND HANDS, AND MILD CARDIAC ARRHYTHMIAS. OTHER SYMPTOMS MAY INCLUDE WHEEZING, WEIGHT LOSS, ANOREXIA, JOINT AND MUSCLE PAIN, ANEMIA, CRANIAL AND PERIPHERAL NEUROPATHIES, ANEMIA, CHEMICAL HEPATITIS, CIRRHOSIS, AND RARELY JAUNDICE. INTOLERANCE TO ALCOHOL AND TOBACCO, TREMOR, GIDDINESS, ANXIETY AND CARDIAC ARRHYTHMIAS HAVE BEEN FOUND IN WORKERS CHRONICALLY EXPOSED TO 5-630 PPM. LIVER, KIDNEY AND BRAIN DAMAGE MAY ALSO OCCUR. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS. ADMINISTRATION TO MICE WAS ASSOCIATED WITH AN INCREASED INCIDENCE OF LIVER AND LUNG TUMORS AND ADENOCARCINOMAS

OF THE RENAL TUBULES IN RATS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

TRICHLOROETHYLENE:

IRRITANT/SENSITIZER.

ACUTE EXPOSURE- MAY CAUSE IRRITATION AND CONTACT DERMATITIS. MAY CAUSE SENSITIZATION IN PREVIOUSLY EXPOSED INDIVIDUALS AND RESULT IN GENERALIZED EXFOLIATIVE OR PAPULOVESICULAR DERMATITIS, AND ERYTHRODERMA. SKIN CONTACT WITH SOAKED CLOTHING FOR A LONG PERIOD OF TIME MAY RESULT IN BLISTERING. MAY BE ABSORBED THROUGH THE SKIN, HOWEVER, DERMAL ABSORPTION IS NOT LIKELY TO BE OF TOXICOLOGICAL SIGNIFICANCE UNDER NORMAL USE.

CHRONIC EXPOSURE- MAY CAUSE A DEFATTING TYPE OF DERMATITIS RESULTING IN ROUGHNESS, CHAPPING, VESICULATION AND SECONDARY INFECTION. REPEATED CONTACT MAY RESULT IN PARALYSIS OF THE FINGERS. SENSITIZATION MAY OCCUR. REPEATED LOW LEVEL EXPOSURE MAY CAUSE INEBRIATION, IRRITABILITY, AND PERSONALITY CHANGES. CHRONIC ABSORPTION MAY ALSO PRODUCE WEIGHT LOSS, NAUSEA, ANOREXIA, FATIGUE, VISUAL IMPAIRMENT, JOINT PAIN AND WHEEZING. JAUNDICE IS RARE.

FIRST AID- 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.

EYE CONTACT:

TRICHLOROETHYLENE:

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT WITH VAPOR OR LIQUID MAY CAUSE BURNS OF THE LIDS, CONJUNCTIVA AND CORNEA WITH SYMPTOMS OF REDNESS, TEARING AND BLURRED VISION. A SPLASH IN THE EYE MAY CAUSE SMARTING PAIN AND INJURY TO THE CORNEAL EPITHELIUM WHICH MAY REGENERATE WITH COMPLETE RECOVERY.

CHRONIC EXPOSURE- REPEATED AND PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS, CORNEAL INFLAMMATION, OPTIC NEURITIS, DOUBLE VISION, NYSTAGMUS, CHANGES IN COLOR PERCEPTION AND BLINDNESS.

FIRST AID- WASH 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.

INGESTION:

TRICHLOROETHYLENE:

NARCOTIC/LIMITED ANIMAL CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE SEVERE BURNING SENSATION IN THE MOUTH, THROAT, ESOPHAGUS, AND STOMACH, DIARRHEA, INEBRIATION, CONFUSION, TACHYCARDIA, AND CENTRAL NERVOUS SYSTEM DEPRESSION WITH DIZZINESS, NAUSEA, VOMITING, HEADACHE, COLLAPSE, CONVULSIONS, AND COMA FOLLOWED BY DEATH FROM RESPIRATORY, CARDIAC OR HEPATORENAL FAILURE. LOW-LEVEL CONCENTRATIONS MAY

CAUSE HEADACHE, AMNESIA, NUMBNESS, WEAKNESS OF THE EXTREMITIES, HEMIPARESIS AND PSYCHOSIS.

CHRONIC EXPOSURE- MAY CAUSE IRRITATION OF MUCOUS MEMBRANES, HEADACHE, DROWSINESS, FATIGUE, GIDDINESS, EXCITABILITY, INDIGESTION, NAUSEA, DISTURBANCES OF SENSATIONS IN THE EXTREMITIES AND OTHER SYMPTOMS NOTED IN CHRONIC INHALATION. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS. REPEATED ORAL ADMINISTRATION PRODUCED LIVER AND LUNG TUMORS IN MICE. TUBULAR CELL NEOPLASMS OF THE KIDNEY AND INTERSTITIAL CELL NEOPLASMS OF THE TESTIS WERE OBSERVED IN RATS.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. MAINTAIN BLOOD PRESSURE AND AIRWAY. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES IN A CLOSED CONTAINER. UNINHIBITED MATERIAL, ON HEATING OR EXPOSURE TO LIGHT, MAY DECOMPOSE OR POLYMERIZE, RELEASING HYDROGEN CHLORIDE.

INCOMPATIBILITIES:

TRICHLOROETHYLENE:

ALKALI: FORMS EXPLOSIVE MIXTURE.

ALUMINUM + DILUTE HYDROCHLORIC ACID: VIOLENT POLYMERIZATION.

ALUMINUM: VIOLENT DECOMPOSITION MAY OCCUR ON CONTACT WITH ALUMINUM POWDER OR FRESHLY FORMED SURFACES.

BARIUM: POSSIBLE DETONATION.

BERYLLIUM: FORMS IMPACT-SENSITIVE MIXTURE.

BORON: FORMS EXPLOSIVE OR IGNITABLE COMPOUND.

1-CHLORO-2,3-EPOXYPROPANE: FORMS EXPLOSIVE MIXTURE.

2,4-BIS(4(2',3'-EPOXYPROPOXY)PHENYL)PROPANE: FORMS EXPLOSIVE MIXTURE.

DI-2,3-EPOXYPROPYL ETHER OF 1,4-BUTANEDIOL: FORMS EXPLOSIVE MIXTURE.

EPOXIDES: POSSIBLE EXPLOSION.

LITHIUM: FORMS IMPACT-SENSITIVE MIXTURE.

MAGNESIUM: FORMS IMPACT-SENSITIVE MIXTURE.

METALS (POWDERED): FORMS EXPLOSIVE OR IGNITABLE COMPOUND.

MONO-2,3-EPOXYPROPYL ETHER OF 1,4-BUTANEDIOL: FORMS EXPLOSIVE MIXTURE.

NITROGEN TETRAOXIDE: FORMS EXPLOSIVE MIXTURE.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

OXYGEN (LIQUID): EXPLODES WHEN INITIATED WITH A BLASTING CAP.

OXYGEN (GAS): EXPLODES UNDER PRESSURE AT ROOM TEMPERATURE.

PERCHLORIC ACID: VIOLENT REACTION.

POTASSIUM: FORMS EXPLOSIVE CHLOROACETYLENES.

POTASSIUM HYDROXIDE: FORMS EXPLOSIVE DICHLOROACETYLENE WHEN HEATED.

SODIUM: FORMS EXPLOSIVE CHLOROACETYLENES.

SODIUM HYDROXIDE: FORMS EXPLOSIVE CHLOROACETYLENES.

TITANIUM (POWDER): FORMS IMPACT-SENSITIVE MIXTURE.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HIGHLY TOXIC FUMES OF PHOSGENE, TOXIC AND CORROSIVE FUMES OF CHLORIDES, AND OXIDES OF CARBON.

POLYMERIZATION:

MAY POLYMERIZE WHEN CATALYZED BY ALUMINUM CHLORIDE IN A SELF-SUSTAINING REACTION WHICH MAY DEVELOP TEMPERATURES UP TO 1350 C. A STABILIZER IS REQUIRED TO PREVENT POLYMERIZATION WHEN HEATED OR EXPOSED TO SUNLIGHT.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U228.

TRICHLOROETHYLENE - REGULATORY LEVEL: 0.5 MG/L

MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE REGULATORY LEVEL MEET THE EPA CHARACTERISTIC OF TOXICITY, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D040.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. CONTAINER MAY EXPLODE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT.

WATER SPILL:

USE ACTIVATED CARBON TO ABSORB SPILLED SUBSTANCE THAT IS DISSOLVED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY.

REPORTABLE QUANTITY (RQ): 100 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

TRICHLOROETHYLENE:

AT ANY DETECTABLE CONCENTRATION:

ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ANY SUPPLIED-AIR RESPIRATOR WITH A FULLFACE-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.

ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 10/24/84

REVISION DATE: 02/25/92

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OHS24511

MATERIAL SAFETY DATA SHEET

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NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: TRITIUM

CAS NUMBER: 10028-17-8

TRADE NAMES/SYNONYMS:

TRITIUM GAS; HYDROGEN-3; MOLECULAR TRITIUM; T2; OHS24511

CHEMICAL FAMILY:

RADIOACTIVE

INORGANIC GAS

MOLECULAR FORMULA: T2

MOLECULAR WEIGHT: 6.032

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=0 PERSISTENCE=3

NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=4 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: TRITIUM
CAS# 10028-17-8

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

OCCUPATIONAL EXPOSURE TO RADIOACTIVE SUBSTANCES MUST ADHERE TO STANDARDS
ESTABLISHED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION,
29 CFR 1910.96, AND/OR THE NUCLEAR REGULATORY COMMISSION, 10 CFR PART 20.

PHYSICAL DATA

DESCRIPTION: COLORLESS GAS. BOILING POINT: -414 F (-248 C)

MELTING POINT: -427 F (-255 C) @ 162 MMHG VAPOR PRESSURE: 260 MMHG @ -253 C

SOLUBILITY IN WATER: SLIGHTLY SOLUBLE VAPOR DENSITY: 0.07

DECAY ENERGY: 0.01861 MEV

HALF-LIFE: 12.26 YEARS

SPECIFIC ACTIVITY: 9,700 CI/G

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

CYLINDER MAY EXPLODE IN HEAT OF FIRE.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY
GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY OR FOG (FLOODING AMOUNTS)
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

DO NOT MOVE DAMAGED CONTAINERS; MOVE UNDAMAGED CONTAINERS OUT OF FIRE ZONE.
FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 63).

CONTACT THE LOCAL, STATE, OR DEPARTMENT OF ENERGY RADIOLOGICAL RESPONSE TEAM.
EXTINGUISH USING AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. COOL CONTAINERS
WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE.
AVOID BREATHING DUSTS OR VAPORS, KEEP UPWIND. KEEP UNNECESSARY PEOPLE
OUT OF AREA UNTIL DECLARED SAFE BY RADIOLOGICAL RESPONSE TEAM.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
RADIOACTIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
RADIOACTIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.415 AND
49 CFR 173.416
EXCEPTIONS: 49 CFR 173.421; 49 CFR 173.422 AND 49 CFR 173.424

TOXICITY

TRITIUM:

CARCINOGEN STATUS: NONE. HOWEVER, EXPOSURE TO IONIZING RADIATION MAY CAUSE
CANCER.

ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.

TARGET EFFECTS: TRITIUM, WITH A BIOLOGICAL HALF-LIFE OF APPROXIMATELY 10 DAYS, MIXES WITH EXTRACELLULAR BODY WATER AND THEREFORE IS DISTRIBUTED UNIFORMLY THROUGHOUT THE BODY.

ADDITIONAL DATA: EMITS BETA PARTICLES. EXPOSURE MAY RESULT IN WHOLE BODY RADIATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:

TRITIUM:

SEE INFORMATION ON BETA RADIATION.

BETA RADIATION:

ACUTE EXPOSURE- BETA EMITTERS MAY OR MAY NOT BE ABSORBED, DEPENDING ON THE SOLUBILITY AND PARTICLE SIZE. INSOLUBLE COMPOUNDS AND HEAVIER PARTICLES MAY REMAIN AT OR NEAR THE SITE OF DEPOSITION AND BE BROUGHT BACK UP THE THROAT VIA CILIARY ACTION. SOLUBLE COMPOUNDS MAY RAPIDLY ENTER THE BLOODSTREAM. LIGHTER PARTICLES MAY PENETRATE TO THE ALVEOLAR SACS AND REMAIN. THE DAMAGE DEPENDS ON HOW QUICKLY THEY ARE ELIMINATED, AND THE SUSCEPTIBILITY OF THE TISSUE IN WHICH THEY ARE STORED. A SINGLE LARGE DOSE MAY LEAD TO RADIATION SICKNESS.

CHRONIC EXPOSURE- THE EFFECTS OF CHRONIC EXPOSURE BY INTERNALLY DEPOSITED BETA RADIATION IS DEPENDENT UPON THE DOSE AND TARGET ORGAN(S). IF THE TOTAL DOSE IS SUFFICIENT, RADIATION SICKNESS MAY OCCUR. POSSIBLE DISORDERS INCLUDE LUNG CANCER, STERILITY, ANEMIA, LEUKEMIA OR BONE CANCER.

RADIATION SICKNESS:

ACUTE EXPOSURE- WHOLE BODY DOSES OF 200-1000 RADS MAY CAUSE ANOREXIA, APATHY, NAUSEA AND VOMITING AND MAY BECOME MAXIMAL WITHIN 6-12 HOURS. AN ASYMPTOMATIC PERIOD OF 24-36 HOURS MAY BE FOLLOWED BY LYMPHOPENIA AND SLOWLY DEVELOPING NEUTROPENIA. THROMBOCYTOPENIA MAY BECOME PROMINENT WITHIN 3-4 WEEKS. THE LYMPH NODES, SPLEEN AND BONE MARROW MAY BEGIN TO ATROPHY. IF BONE MARROW DEPRESSION REACHES A CRITICAL LEVEL, DEATH MAY OCCUR FROM OVERWHELMING INFECTION. WHOLE BODY DOSES OF 400 OR MORE RADS MAY CAUSE INTRACTABLE NAUSEA, VOMITING AND DIARRHEA THAT MAY LEAD TO SEVERE DEHYDRATION, VASCULAR COLLAPSE AND DEATH. REGENERATION OF THE INTESTINAL EPITHELIUM MAY OCCUR, BUT MAY BE FOLLOWED BY HEMATOPOIETIC FAILURE WITHIN 2-3 WEEKS. WHOLE BODY DOSES OF 600 OR MORE RADS MAY BE FATAL DUE TO GASTROINTESTINAL OR HEMATOPOIETIC MALFUNCTION. WITH DOSES <600 RADS, THE POSSIBILITY OF SURVIVAL IS INVERSELY RELATED TO THE DOSE. WHOLE BODY DOSES >3000 RADS GENERALLY CAUSE NAUSEA, VOMITING, LISTLESSNESS, DROWSINESS RANGING FROM APATHY TO PROSTRATION, TREMORS, CONVULSIONS, ATAXIA AND DEATH WITHIN A FEW HOURS. THE GONADS ARE ALSO PARTICULARLY RADIOSENSITIVE. A SINGLE DOSE OF 30 RADS RESULTS IN TEMPORARY STERILITY AMONG MEN. IN WOMEN, LOSS OF FERTILITY MAY BE INDICATED BY LOSS OF MENSTRUATION.

CHRONIC EXPOSURE- THE DELAYED EFFECTS OF RADIATION MAY BE DUE EITHER TO A SINGLE LARGE OVEREXPOSURE OR CONTINUING LOW-LEVEL OVEREXPOSURE AND MAY INCLUDE CANCER, GENETIC EFFECTS, SHORTENING OF LIFE SPAN AND CATARACTS. CANCER IS OBSERVED MOST FREQUENTLY IN THE HEMATOPOIETIC SYSTEM, THYROID, BONE AND SKIN. LEUKEMIA IS AMONG THE MOST LIKELY FORMS OF MALIGNANCY. LUNG CANCER MAY ALSO OCCUR DUE TO RADIOACTIVE MATERIALS RESIDING IN THE LUNGS. GENETIC EFFECTS MAY RANGE FROM POINT MUTATIONS TO SEVERE

CHROMOSOME DAMAGE SUCH AS STRAND BREAKAGE, TRANSLOCATIONS, AND DELETIONS. IF THE GERM CELLS HAVE BEEN AFFECTED, THE EFFECTS OF THE MUTATION MAY NOT BECOME APPARENT UNTIL THE NEXT GENERATION, OR EVEN LATER.

FIRST AID- REMOVE FROM EXPOSURE AREA TO A RESTRICTED AREA WITH FRESH AIR AS QUICKLY AS POSSIBLE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION BY ADMINISTERING OXYGEN; MOUTH-TO-MOUTH RESUSCITATION SHOULD BE AVOIDED TO PREVENT EXPOSURE TO THE PERSON RENDERING FIRST AID. ANY EVIDENCE OF SERIOUS CONTAMINATION INDICATES THAT TREATMENT MUST BE INSTITUTED. (INHALATION OF RADIOACTIVE PARTICLES MAY INDICATE THAT OTHER PARTS OF THE BODY WERE ALSO CONTAMINATED, SUCH AS THE DIGESTIVE TRACT, SKIN AND EYES.) IF TIME PERMITS, WIPE THE FACE WITH WET FILTER PAPER, FORCE COUGHING AND BLOWING OF THE NOSE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA #3, PG. 65)

!! WARNING!!

THE VICTIM MAY BE CONTAMINATED WITH RADIOACTIVE PARTICLES. THOROUGH DECONTAMINATION SHOULD BE STARTED BEFORE THE VICTIM IS MOVED TO THE MEDICAL AREA.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID MUST BE MONITORED FOR RADIOACTIVITY AND THOROUGHLY DECONTAMINATED IF NECESSARY (IAEA #3, PG.65).

SKIN CONTACT:

TRITIUM:

SEE INFORMATION ON BETA RADIATION.

BETA RADIATION:

ACUTE EXPOSURE- CONTACT MAY CAUSE ERYTHEMA, CHANGES IN PIGMENTATION, EPILATION, BLISTERING, NECROSIS, AND ULCERATION. THE SKIN IS ALSO SUBJECT TO CANCER FORMATION AFTER RELATIVELY SEVERE SKIN DAMAGE. THE EFFECTS MAY BE WORSE AT THE SITE OF A WOUND. ABSORPTION OR PENETRATION THROUGH DAMAGED SKIN MAY RESULT IN RADIATION SICKNESS.

CHRONIC EXPOSURE- SMALL REPEATED DOSES MAY CAUSE DERMATITIS. THE HANDS MAY BECOME DRY AND VIOLET-RED. ALOPECIA AND URTICARIA MAY OCCUR. THE SKIN MAY BECOME THIN. IN ADVANCED CASES, KERATOSES AND WARTS MAY BE FORMED, BETWEEN WHICH THE SKIN MAY CRACK EASILY. PROLONGED OR REPEATED EXPOSURE MAY RESULT IN RADIATION SICKNESS.

RADIATION SICKNESS:

THE CLINICAL COURSE OF RADIATION SICKNESS DEPENDS UPON THE DOSE, DOSE RATE, AREA OF THE BODY AFFECTED AND TIME AFTER EXPOSURE. EXTERNAL AND INTERNAL RADIOACTIVITY OF ANY TYPE MAY CAUSE RADIATION SICKNESS.

RADIATION SICKNESS HAS THREE (3) CLEARLY DEFINED SYNDROMES WHICH ARE DESCRIBED IN DETAIL IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A SUITABLE AREA FOR DECONTAMINATION AS QUICKLY AS POSSIBLE. REMOVE CLOTHING AND SHOES IMMEDIATELY. THOROUGHLY WASH THE VICTIM WITH SOAP AND WATER, PAYING PARTICULAR ATTENTION TO THE HEAD, FINGER NAILS AND PALMS OF THE HANDS. UPON COMPLETION OF WASHING, MONITOR THE VICTIM FOR RADIOACTIVITY. IT IS IMPERATIVE THAT THE SKIN SHOULD BE DECONTAMINATED AS QUICKLY AS POSSIBLE. MINUTE SKIN INJURIES GREATLY INCREASE THE DANGER OF ISOTOPE PENETRATION INTO THE VICTIM; SHAVING SHOULD NOT BE ATTEMPTED. IF WATER AND SOAP HAVE BEEN INADEQUATE IN REMOVING THE RADIOACTIVE COMPOUND, DECONTAMINATING COMPOUNDS CONSISTING OF

SURFACTANTS AND ABSORBENT SUBSTANCES MAY BE EFFECTIVE. COMPLEXING REAGENTS MAY ALSO BE OF USE. THE USE OF ORGANIC SOLVENTS IS TO BE AVOIDED, AS THEY MAY INCREASE THE SOLUBILITY AND ABSORPTION OF THE RADIOACTIVE SUBSTANCE. SKIN CONTAMINATION WITH RADIATION MAY BE AN INDICATION THAT OTHER PARTS OF THE BODY HAVE BEEN EXPOSED (IAEA # 47, PG.9; IAEA #3, PG. 62).

!! WARNING!!

CONTAMINATED CLOTHING MUST BE STORED IN A METAL CONTAINER FOR LATER DECONTAMINATION OR DISPOSAL. THE WATER USED TO WASH THE VICTIM MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL. ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PG.62).

EYE CONTACT:

TRITIUM:

SEE INFORMATION ON BETA RADIATION.

BETA RADIATION:

ACUTE EXPOSURE- EXPOSURE OF THE EYE TO BETA EMISSION MAY RESULT IN CORNEA AND CONJUNCTIVA INFLAMMATION. THE MOST SENSITIVE PART OF THE EYE IS THE CRYSTALLINE LENS. A LATE EFFECT OF EYE IRRADIATION IS CATARACT FORMATION. IT MAY BEGIN ANYWHERE FROM 6 MONTHS TO SEVERAL YEARS AFTER EXPOSURE. THE CATARACTS BEGIN AT THE POSTERIOR POLE OF THE LENS, AND CONTINUE UNTIL THE ENTIRE LENS HAS BEEN AFFECTED. GROWTH OF THE OPACITY MAY STOP AT ANY POINT. THE RATE OF GROWTH AND THE DEGREE OF OPACITY ARE DEPENDENT UPON THE DOSE OF RADIATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO BETA EMISSION MAY CAUSE CATARACTS, AS DISCUSSED ABOVE. OF THE WELL-DOCUMENTED LATE EFFECTS OF RADIATION ON MAN, LEUKEMIA AND CATARACT FORMATION HAVE BEEN OBSERVED AT LOWER DOSES THAN THOSE REQUIRED TO CAUSE SKIN SCARRING, CANCER, AND BONE TUMORS. THE LENS OF THE EYE SHOULD BE CONSIDERED TO BE A CRITICAL ORGAN.

RADIATION SICKNESS:

THE EYES ARE VERY RADIOSENSITIVE; A SINGLE DOSE OF 100 RADS MAY CAUSE CONJUNCTIVITIS AND KERATITIS.

IT IS UNLIKELY THAT A DOSE SUFFICIENT TO CAUSE RADIATION SICKNESS WOULD OCCUR IF ONLY THE EYES WERE IRRADIATED. HOWEVER, IF EYE DAMAGE BY IONIZING RADIATION OCCURS, IT MAY BE BEST TO ASSUME THAT OTHER PARTS OF THE BODY HAVE ALSO BEEN CONTAMINATED. SYMPTOMS OF RADIATION SICKNESS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A RESTRICTED AREA FOR DECONTAMINATION.

THOROUGHLY WASH EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE THE UPPER AND LOWER LIDS (APPROXIMATELY 15 MINUTES). FOLLOWING THE WATER TREATMENT, PROVIDE AN ISOTONIC SOLUTION. DO NOT USE EYEBATHS, RATHER PROVIDE A CONTINUOUS AND COPIOUS SUPPLY OF FLUID. MONITOR THE VICTIM FOR RADIOACTIVITY. IF ACTIVITY IS PRESENT, REWASH THE EYES, AND REMONITOR UNTIL LITTLE OR NO RADIOACTIVITY IS PRESENT. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 3, PG. 65; IAEA # 47, PG. 35).

!! WARNING!!

ANY WATER USED TO WASH THE VICTIMS EYES MUST BE STORED IN A METAL CONTAINER FOR LATER DISPOSAL. ANY OTHER ARTICLES THAT ARE USED TO DECONTAMINATE THE VICTIM MUST ALSO BE STORED IN METAL CONTAINERS FOR LATER DECONTAMINATION OR DISPOSAL.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #3, PG.65; IAEA # 47, PG. 35).

INGESTION:

TRITIUM:

SEE INFORMATION ON BETA RADIATION.

BETA RADIATION:

ACUTE EXPOSURE- THE FATE OF BETA EMITTERS DEPENDS ON THEIR PHYSICAL AND BIOLOGICAL HALF-LIFE. INGESTION MAY LEAD RADIATION SICKNESS.

CHRONIC EXPOSURE- REPEATED INGESTION OF BETA EMITTERS MAY LEAD TO RADIATION SICKNESS.

RADIATION SICKNESS:

THE SYMPTOMS OF RADIATION SICKNESS DEPENDS UPON THE DOSE RECEIVED. IT MAY RESULT FROM ACUTE OR CHRONIC EXPOSURE TO ANY FORM OF RADIATION. THE SYMPTOMS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID: IN THE CASE OF INGESTION OF RADIOACTIVE SUBSTANCES, THE MOUTH SHOULD BE RINSED OUT IMMEDIATELY AFTER THE ACCIDENT, CARE BEING TAKEN NOT TO SWALLOW THE WATER USED FOR THIS PURPOSE. VOMITING SHOULD BE INDUCED EITHER MECHANICALLY, OR WITH SYRUP OF IPECAC. DO NOT INDUCE VOMITING IN AN UNCONSCIOUS PERSON. LAVAGE MAY BE USEFUL. CARE SHOULD BE TAKEN TO AVOID ASPIRATION. THE VOMITUS AND LAVAGE FLUIDS SHOULD BE SAVED FOR EXAMINATION AND MONITORING. FURTHER ACTION DEPENDS ON THE NATURE OF THE RADIOACTIVE SUBSTANCE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 47, PG.9; IAEA #47, PG.9; IAEA # 3, PP. 59,66).

!!WARNING!!

THE GASTRIC FLUIDS AND FLUIDS USED FOR LAVAGE MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL. THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED, IF NECESSARY, BEFORE BEING TRANSPORTED TO A MEDICAL FACILITY.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PP. 59,66).

ANTIDOTE:

TRITIUM POISONING:

NO SPECIFIC ANTIDOTE RECOMMENDED. TREATMENT BY INCREASING LIQUID INTAKE AND BY PROMOTING DIURESIS HAS BEEN INDICATED. IT IS POSSIBLE TO REDUCE THE BIOLOGICAL HALF-LIFE FROM 10 DAYS TO 2.4 DAYS SIMPLY BY INCREASING THE CONSUMPTION OF DRINKING WATER. THE ADDITION OF DIURETICS MAY BE INDICATED, BUT THE RISKS AND CONTRAINDICATIONS OF THE THERAPY SHOULD BE KEPT IN MIND. IN THE EVENT OF MASSIVE CONTAMINATION, THERE MIGHT BE A NEED FOR SPECIAL TREATMENT SUCH AS PERITONEAL DIALYSIS OR TREATMENT WITH AN ARTIFICIAL KIDNEY. (IAEA SAFETY SERIES #47 RECOMMENDATIONS 1978). TREATMENT SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
TRITIUM:
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

DECOMPOSITION:
TRITIUM:
EMITS LOW ENERGY BETA PARTICLES ON DECAYING.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 10 CFR 20.
STORE IN ACCORDANCE WITH 29 CFR 1910.101.
STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.
DISPOSAL MUST BE IN ACCORDANCE WITH 10 CFR 20 AND 60.

CONDITIONS TO AVOID

RADIATION HAZARD, DO NOT ALLOW MATERIAL TO SPREAD OR CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

DO NOT TOUCH DAMAGED CONTAINERS OR SPILLED MATERIAL. DAMAGE TO OUTER CONTAINER MAY NOT AFFECT PRIMARY INNER CONTAINER. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGE SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AT LEAST 150 FEET UPWIND; GREATER DISTANCES MAY BE NECESSARY IF ADVISED BY QUALIFIED RADIATION AUTHORITY. ISOLATE HAZARD AREA AND DENY ENTRY. ENTER SPILL AREA ONLY TO SAVE LIFE; LIMIT ENTRY TO SHORTEST POSSIBLE TIME. DETAIN UNINJURED PERSONS AND EQUIPMENT EXPOSED TO RADIOACTIVE MATERIAL UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY. DELAY CLEANUP UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

ONE METHOD OF CONTROLLING EXTERNAL RADIATION EXPOSURE IS TO PROVIDE ADEQUATE SHIELDING. THE ABSORBING MATERIAL USED AND THE THICKNESS REQUIRED TO ATTENUATE THE RADIATION TO ACCEPTABLE LEVELS DEPENDS ON THE TYPE OF RADIATION, ITS ENERGY, THE FLUX AND THE DIMENSIONS OF THE SOURCE.

ALPHA PARTICLES- FOR THE ENERGY RANGE OF ALPHA PARTICLES USUALLY ENCOUNTERED, A FRACTION OF A MILLIMETER OF ANY ORDINARY MATERIAL IS SUFFICIENT FOR ABSORBANCE. THIN RUBBER, ACRYLIC, STOUT PAPER, OR CARDBOARD WILL SUFFICE.

BETA PARTICLES- BETA PARTICLES ARE MORE PENETRATING THAN ALPHA, AND REQUIRE MORE SHEILDING. MATERIALS COMPOSED MOSTLY OF ELEMENTS OF LOW ATOMIC NUMBER SUCH AS ACRYLIC, ALUMINUM AND THICK RUBBER ARE MOST APPROPRIATE FOR THE ABSORPTION OF BETA PARTICLES. FOR EXAMPLE, 1/4 INCH OF ACRYLIC WILL ABSORB ALL BETA PARTICLES UP TO 1 MEV. WITH HIGH ENERGY BETA RADIATION FROM LARGE SOURCES, BREMSSTRAHLUNG (X RAY PRODUCTION) CONTRIBUTION MAY BECOME SIGNIFICANT AND IT MAY BE NECESSARY TO PROVIDE ADDITIONAL SHEILDING OF HIGH ATOMIC WEIGHT MATERIAL, SUCH AS LEAD, TO ATTENUATE THE BREMSSTRAHLUNG RADIATION.

GAMMA RAYS- THE MOST SUITABLE MATERIALS FOR SHIELDING GAMMA RADIATION ARE LEAD AND IRON. THE THICKNESS REQUIRED WILL DEPEND ON WHETHER THE SOURCE IS PRODUCING NARROW OR BROAD BEAM RADIATION. PRIMARY AND SECONDARY PROTECTIVE BARRIERS MAY BE REQUIRED TO BLOCK ALL RADIATION.

RESPIRATOR:

THESE RECOMMENDED RESPIRATORS SHOULD PROVIDE PROTECTION FOR THE RESPIRATORY TRACT AGAINST MOST OF THE RADIOACTIVE PARTICLES ENCOUNTERED IN THE WORK PLACE. THESE RESPIRATORS WILL NOT OFFER PROTECTION AGAINST BETA AND GAMMA RADIATION, BUT MAY BLOCK ALPHA PARTICLES. FROM 10CFR20.103 APPENDIX A. RESPIRATORY EQUIPMENT MUST BE CERTIFIED BY NIOSH/MSHA.

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.

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH 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.

CLOTHING:

DISPOSABLE OVERGARMENTS, INCLUDING HEAD COVERINGS AND FOOT COVERING, SHOULD BE WORN BY ANY EMPLOYEE ENGAGED IN HANDLING ANY RADIOACTIVE SUBSTANCE. THESE GARMENTS ARE ALSO RECOMMENDED EVEN IF THE EMPLOYEE IS WORKING WITH A "GLOVE BOX" CONTAINMENT SYSTEM. CERTAIN CLOTHING FIBERS MAY BE USEFUL IN DOSIMETRY SO CLOTHING SHOULD BE KEPT.

IN THE EVENT OF AN ACCIDENT, LARGE SCALE RELEASE OR A LARGE SCALE CLEAN-UP FULL PROTECTIVE CLOTHING WILL BE NECESSARY.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

WARNING!

USED GLOVES MAY PRESENT A RADIATION HAZARD AND SHOULD BE DISPOSED OF AS RADIOACTIVE WASTE.

EYE PROTECTION:

EMPLOYEE MUST WEAR APPROPRIATE EYE PROTECTION THAT WILL NOT ALLOW THE INTRODUCTION OF PARTICLES INTO THE EYES. CONTACT LENSES SHOULD NOT BE WORN.

CLOTHING, GLOVE, AND EYE PROTECTION EQUIPMENT WILL PROVIDE PROTECTION AGAINST ALPHA PARTICLES, AND SOME PROTECTION AGAINST BETA PARTICLES, DEPENDING ON THICKNESS, BUT WILL NOT SHIELD GAMMA RADIATION.

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URANIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS24610

CAS#: 7440-61-1 FORMULA: U

URANIUM IS A GRAYISH WHITE SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS. SEE CODE OF FEDERAL REGULATIONS FOR OSHA STANDARDS CONCERNING EXPOSURE TO RADIOACTIVE SUBSTANCES.

FIRE AND EXPLOSION HAZARDS:

DANGEROUS FIRE HAZARD. DANGEROUS EXPLOSION HAZARD. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, LEAVE THE AREA IMMEDIATELY. DO NOT TRY TO PUT OUT THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE SKIN, AND REDNESS AND SWELLING OF THE EYES WITH POSSIBLE DAMAGE. ADDITIONAL EFFECTS MAY INCLUDE CHANGES IN SKIN COLOR, NAUSEA, VOMITING, DIARRHEA, BLOOD IN THE URINE, YELLOW COLOR OF THE SKIN AND EYES, SLEEPINESS, INCOORDINATION, TWITCHING, SEIZURES, HEART AND LUNG EFFECTS, AND BLOOD, SKIN, STOMACH, INTESTINAL, AND KIDNEY DAMAGE. MAY CAUSE REPRODUCTIVE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO THE EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE SKIN, AND CANCER MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY CATCH FIRE WHEN EXPOSED TO AIR OR WATER, OR WHEN CONFINED. SEE MSDS FOR COMPLETE LISTING OF INCOMPATIBLE SUBSTANCES.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS24610

7440-61-1

URANIUM

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MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-61-1
RTECS NUMBER: YR3490000

SUBSTANCE: URANIUM

TRADE NAMES/SYNONYMS:

URANIUM, PYROPHORIC; URANIUM I; URANIUM METAL, PYROPHORIC; URANIUM 238;
U-238; STCC 4926186; UN 2979; OHS24610

CHEMICAL FAMILY:
METAL

RADIOACTIVE

MOLECULAR FORMULA: U

MOLECULAR WEIGHT: (238)

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=3 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=3

COMPONENTS AND CONTAMINANTS

COMPONENT: URANIUM
CAS# 7440-61-1

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

URANIUM, INSOLUBLE COMPOUNDS (AS U):

0.2 MG/M3 OSHA TWA; 0.6 MG/M3 OSHA STEL

0.2 MG/M3 ACGIH TWA; 0.6 MG/M3 ACGIH STEL

0.2 MG/M3 NIOSH RECOMMENDED TWA; 0.6 MG/M3 NIOSH RECOMMENDED STEL

0.25 MG/M3 DFG MAK TWA (TOTAL DUST);

2.5 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

OCCUPATIONAL EXPOSURE TO RADIOACTIVE SUBSTANCES MUST ADHERE TO STANDARDS
ESTABLISHED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION,
29 CFR 1910.96, AND/OR THE NUCLEAR REGULATORY COMMISSION, 10 CFR PART 20.

PHYSICAL DATA

DESCRIPTION: GRAYISH WHITE, DENSE, SILVERY, RADIOACTIVE SOLID THAT IS STRONGLY ELECTROPOSITIVE. ON VIGOROUS SHAKING THE METALLIC PARTICLES EXHIBIT LUMINESCENCE. IT IS DUCTILE AND MALLEABLE AND IGNITES SPONTANEOUSLY IN AIR.

BOILING POINT: 6904 F (3818 C) MELTING POINT: 2070 F (1132 C)

SPECIFIC GRAVITY: 19.0 SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN ACETONE, IN ACIDS AND INSOLUBLE IN ALKALIES AND ALCOHOL.

NATURAL URANIUM IS 99.27 % U-238, WHICH HAS A HALF-LIFE OF 4.51 E 9 YEARS, AND DECAYS BY ALPHA EMISSION.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

DANGEROUS EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FLASH POINT: FLAMMABLE SOLID

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY OR FOG (FLOODING AMOUNTS) (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 65).

DO NOT MOVE DAMAGED CONTAINERS; MOVE UNDAMAGED CONTAINERS OUT OF FIRE ZONE. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 63).

CONTACT THE LOCAL, STATE, OR DEPARTMENT OF ENERGY RADIOLOGICAL RESPONSE TEAM. USE SUITABLE AGENT FOR SURROUNDING FIRE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING DUSTS OR VAPORS, KEEP UPWIND. KEEP UNNECESSARY PEOPLE OUT OF AREA UNTIL DECLARED SAFE BY RADIOLOGICAL RESPONSE TEAM.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
RADIOACTIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
RADIOACTIVE AND FLAMMABLE SOLID.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.418
EXCEPTIONS: NONE

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
URANIUM METAL, PYROPHORIC-UN 2979

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
7 - RADIOACTIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
RADIOACTIVE, SPONTANEOUSLY COMBUSTIBLE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.418
BULK PACKAGING: NONE

TOXICITY

URANIUM:
CARCINOGEN STATUS: NONE.
THE TOXICITY OF URANIUM METAL HAS NOT BEEN QUANTIFIED. URANIUM MAY BE A
SKIN, EYE, AND MUCOUS MEMBRANE IRRITANT, AS WELL AS A NEPHROTOXIN. URANIUM
METAL USUALLY DOES NOT CONSTITUTE AN EXTERNAL RADIATION EXPOSURE HAZARD SINCE
IT EMITS MAINLY ALPHA-RADIATION AT A LOW ENERGY LEVEL. IT MAY CONSTITUTE AN
INTERNAL RADIATION HAZARD IF IT IS ABSORBED INTO THE BODY, THUS DELIVERING
ALPHA EMISSION ONTO TISSUES IN WHICH IT IS STORED.

HEALTH EFFECTS AND FIRST AID

INHALATION:
URANIUM:
RADIOACTIVE/NEPHROTOXIN. 30 MG/M3 IMMEDIATELY DANGEROUS TO LIFE AND HEALTH.
ACUTE EXPOSURE- URANIUM MAY ENTER THE BODY THROUGH INHALATION OF FINE
PARTICLES THAT ARE APPROXIMATELY 1 MICRON IN DIAMETER. URANIUM POISONING
IS CHARACTERIZED BY GENERALIZED HEALTH IMPAIRMENT. IT MAY CAUSE CHANGES IN

THE KIDNEYS, LIVER, LUNGS, AND CARDIOVASCULAR, NERVOUS, AND HEMOPOIETIC SYSTEMS, AND DISORDERS OF PROTEIN AND CARBOHYDRATE METABOLISM. SYMPTOMS MAY INCLUDE OLIGURIA, HEMATURIA, ALBUMINURIA, AND JAUNDICE.

CHRONIC EXPOSURE- WORKERS EXPOSED TO HIGH AVERAGE LEVELS OF URANIUM DUST IN A PLANT AT OAK RIDGE HAVE NOT HAD INCREASED MORTALITY RATES FROM LUNG CANCER, LEUKEMIA, BONE CANCER, OR DISEASES OF THE RESPIRATORY AND GENITOURINARY SYSTEMS. LUNG CANCER IN URANIUM MINERS IS PROBABLY THE RESULT OF INHALATION OF RADON DAUGHTERS FOUND IN THESE MINES. CHRONIC POISONING GIVES CHEST FINDINGS OF PNEUMOCONIOSIS, PRONOUNCED BLOOD CHANGES AND GENERALIZED INJURY. CANCER OF LYMPHATIC AND BLOOD FORMING TISSUES MAY RESULT. SEE THE FOLLOWING SECTIONS REGARDING THE EFFECTS OF INHALATION OF AN ALPHA EMITTER, AND RADIATION SICKNESS.

ALPHA RADIATION:

ACUTE EXPOSURE- ALPHA RADIATION IS DENSELY IONIZING WITH VERY HIGH ENERGY AND WILL KILL CELLS IMMEDIATELY ADJACENT TO THE SOURCE OF CONTACT. DAMAGED CELLS MAY NOT RECOVER OR BE REPAIRED. ALPHA EMITTERS MAY OR MAY NOT BE ABSORBED, DEPENDING ON THE SOLUBILITY AND PARTICLE SIZE. INSOLUBLE COMPOUNDS MAY REMAIN AT OR NEAR THE SITE OF DEPOSITION, AND SOLUBLE COMPOUNDS MAY RAPIDLY ENTER THE BLOODSTREAM. HEAVIER PARTICLES WILL BE BROUGHT UP TO THE THROAT BY CILIARY ACTION, AND MAY THEN BE SWALLOWED. THE LIGHTER PARTICLES MAY BE LODGED DEEP IN THE ALVEOLAR AIR SACS AND REMAIN. THE DAMAGE DEPENDS ON HOW QUICKLY THEY ARE ELIMINATED, AND THE SUSCEPTIBILITY OF THE TISSUE IN WHICH THEY ARE STORED. A SINGLE LARGE DOSE OF RADIATION MAY LEAD TO RADIATION SICKNESS.

CHRONIC EXPOSURE- THE EFFECTS OF CHRONIC EXPOSURE BY INTERNALLY DEPOSITED ALPHA RADIATION IS DEPENDENT UPON THE DOSE AND TARGET ORGAN(S). IF THE TOTAL DOSE IS SUFFICIENT, RADIATION SICKNESS MAY OCCUR. POSSIBLE DISORDERS INCLUDE LUNG CANCER, STERILITY, ANEMIA, LEUKEMIA, OR BONE CANCER.

RADIATION SICKNESS:

ACUTE EXPOSURE- WHOLE BODY DOSES OF 200-1000 RADS MAY CAUSE ANOREXIA, APATHY, NAUSEA AND VOMITING AND MAY BECOME MAXIMAL WITHIN 6-12 HOURS. AN ASYMPTOMATIC PERIOD OF 24-36 HOURS MAY BE FOLLOWED BY LYMPHOPENIA AND SLOWLY DEVELOPING NEUTROPENIA. THROMBOCYTOPENIA MAY BECOME PROMINENT WITHIN 3-4 WEEKS. THE LYMPH NODES, SPLEEN AND BONE MARROW MAY BEGIN TO ATROPHY. IF BONE MARROW DEPRESSION REACHES A CRITICAL LEVEL, DEATH MAY OCCUR FROM OVERWHELMING INFECTION. WHOLE BODY DOSES OF 400 OR MORE RADS MAY CAUSE INTRACTABLE NAUSEA, VOMITING AND DIARRHEA THAT MAY LEAD TO SEVERE DEHYDRATION, VASCULAR COLLAPSE AND DEATH. REGENERATION OF THE INTESTINAL EPITHELIUM MAY OCCUR, BUT MAY BE FOLLOWED BY HEMATOPOIETIC FAILURE WITHIN 2-3 WEEKS. WHOLE BODY DOSES OF 600 OR MORE RADS MAY BE FATAL DUE TO GASTROINTESTINAL OR HEMATOPOIETIC MALFUNCTION. WITH DOSES <600 RADS, THE POSSIBILITY OF SURVIVAL IS INVERSELY RELATED TO THE DOSE. WHOLE BODY DOSES >3000 RADS GENERALLY CAUSE NAUSEA, VOMITING, LISTLESSNESS, DROWSINESS RANGING FROM APATHY TO PROSTRATION, TREMORS, CONVULSIONS, ATAXIA AND DEATH WITHIN A FEW HOURS. THE GONADS ARE ALSO PARTICULARLY RADIOSENSITIVE. A SINGLE DOSE OF 30 RADS RESULTS IN TEMPORARY STERILITY AMONG MEN. IN WOMEN, LOSS OF FERTILITY MAY BE INDICATED BY LOSS OF MENSTRUATION.

CHRONIC EXPOSURE- THE DELAYED EFFECTS OF RADIATION MAY BE DUE EITHER TO A SINGLE LARGE OVEREXPOSURE OR CONTINUING LOW-LEVEL OVEREXPOSURE AND MAY INCLUDE CANCER, GENETIC EFFECTS, SHORTENING OF LIFE SPAN AND CATARACTS. CANCER IS OBSERVED MOST FREQUENTLY IN THE HEMATOPOIETIC SYSTEM, THYROID,

BONE AND SKIN. LEUKEMIA IS AMONG THE MOST LIKELY FORMS OF MALIGNANCY. LUNG CANCER MAY ALSO OCCUR DUE TO RADIOACTIVE MATERIALS RESIDING IN THE LUNGS. GENETIC EFFECTS MAY RANGE FROM POINT MUTATIONS TO SEVERE CHROMOSOME DAMAGE SUCH AS STRAND BREAKAGE, TRANSLOCATIONS, AND DELETIONS. IF THE GERM CELLS HAVE BEEN AFFECTED, THE EFFECTS OF THE MUTATION MAY NOT BECOME APPARENT UNTIL THE NEXT GENERATION, OR EVEN LATER.

FIRST AID- REMOVE FROM EXPOSURE AREA TO A RESTRICTED AREA WITH FRESH AIR AS QUICKLY AS POSSIBLE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION BY ADMINISTERING OXYGEN; MOUTH-TO-MOUTH RESUSCITATION SHOULD BE AVOIDED TO PREVENT EXPOSURE TO THE PERSON RENDERING FIRST AID. ANY EVIDENCE OF SERIOUS CONTAMINATION INDICATES THAT TREATMENT MUST BE INSTITUTED. (INHALATION OF RADIOACTIVE PARTICLES MAY INDICATE THAT OTHER PARTS OF THE BODY WERE ALSO CONTAMINATED, SUCH AS THE DIGESTIVE TRACT, SKIN AND EYES.) IF TIME PERMITS, WIPE THE FACE WITH WET FILTER PAPER, FORCE COUGHING AND BLOWING OF THE NOSE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA #3, PG. 65)

!! WARNING!!

THE VICTIM MAY BE CONTAMINATED WITH RADIOACTIVE PARTICLES. THOROUGH DECONTAMINATION SHOULD BE STARTED BEFORE THE VICTIM IS MOVED TO THE MEDICAL AREA.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID MUST BE MONITORED FOR RADIOACTIVITY AND THOROUGHLY DECONTAMINATED IF NECESSARY (IAEA #3, PG.65).

SKIN CONTACT:

URANIUM:

RADIOACTIVE.

ACUTE EXPOSURE- THERE IS NO EVIDENCE THAT INSOLUBLE URANIUM COMPOUNDS CAN BE ABSORBED THROUGH THE SKIN; INSOLUBLE SALTS PRODUCED NO SIGNS OF POISONING AFTER SKIN CONTACT. URANIUM MAY IRRITATE THE SKIN.

CHRONIC EXPOSURE- PROLONGED SKIN CONTACT WITH INSOLUBLE URANIUM COMPOUNDS SHOULD BE AVOIDED BECAUSE OF POTENTIAL RADIATION DAMAGE TO BASAL CELLS. DERMATITIS HAS OCCURRED AS A RESULT OF HANDLING SOME INSOLUBLE URANIUM COMPOUNDS. SEE THE FOLLOWING SECTIONS REGARDING ALPHA RADIATION AND RADIATION SICKNESS.

ALPHA RADIATION:

ACUTE EXPOSURE- ALPHA RADIATION IS NOT USUALLY AN EXTERNAL HAZARD. HOWEVER, LOCAL DAMAGE MAY OCCUR AT THE SITE OF A WOUND. ABSORPTION OR PENETRATION THROUGH DAMAGED SKIN MAY RESULT IN RADIATION SICKNESS.

CHRONIC EXPOSURE- PROLONGED OR REPEATED CONTACT MAY RESULT IN RADIATION SICKNESS.

RADIATION SICKNESS:

THE CLINICAL COURSE OF RADIATION SICKNESS DEPENDS UPON THE DOSE, DOSE RATE, AREA OF THE BODY AFFECTED AND TIME AFTER EXPOSURE. EXTERNAL AND INTERNAL RADIOACTIVITY OF ANY TYPE MAY CAUSE RADIATION SICKNESS.

RADIATION SICKNESS HAS THREE (3) CLEARLY DEFINED SYNDROMES WHICH ARE DESCRIBED IN DETAIL IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A SUITABLE AREA FOR DECONTAMINATION AS QUICKLY AS POSSIBLE. REMOVE CLOTHING AND SHOES IMMEDIATELY. THOROUGHLY WASH THE VICTIM WITH SOAP AND WATER, PAYING PARTICULAR ATTENTION TO THE HEAD,

FINGER NAILS AND PALMS OF THE HANDS. UPON COMPLETION OF WASHING, MONITOR THE VICTIM FOR RADIOACTIVITY. IT IS IMPERATIVE THAT THE SKIN SHOULD BE DECONTAMINATED AS QUICKLY AS POSSIBLE. MINUTE SKIN INJURIES GREATLY INCREASE THE DANGER OF ISOTOPE PENETRATION INTO THE VICTIM; SHAVING SHOULD NOT BE ATTEMPTED. IF WATER AND SOAP HAVE BEEN INADEQUATE IN REMOVING THE RADIOACTIVE COMPOUND, DECONTAMINATING COMPOUNDS CONSISTING OF SURFACTANTS AND ABSORBENT SUBSTANCES MAY BE EFFECTIVE. COMPLEXING REAGENTS MAY ALSO BE OF USE. THE USE OF ORGANIC SOLVENTS IS TO BE AVOIDED, AS THEY MAY INCREASE THE SOLUBILITY AND ABSORPTION OF THE RADIOACTIVE SUBSTANCE. SKIN CONTAMINATION WITH RADIATION MAY BE AN INDICATION THAT OTHER PARTS OF THE BODY HAVE BEEN EXPOSED (IAEA # 47, PG.9; IAEA #3, PG. 62).

!! WARNING!!

CONTAMINATED CLOTHING MUST BE STORED IN A METAL CONTAINER FOR LATER DECONTAMINATION OR DISPOSAL. THE WATER USED TO WASH THE VICTIM MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL. ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PG.62).

EYE CONTACT:

URANIUM:

RADIOACTIVE.

ACUTE EXPOSURE- DUST MAY BE IRRITATING TO THE EYES. A VARIETY OF SOLUBLE AND INSOLUBLE COMPOUNDS OF URANIUM WERE TESTED ON THE EYES OF RABBITS. THE INSOLUBLE COMPOUNDS CAUSED THE MILDST DEGREE OF INJURY. THE EFFECTS OF EYE CONTACT WITH ANY URANIUM COMPOUND TEND TO BE NECROSIS OF THE CONJUNCTIVAE AND EYELIDS, AND ULCERATION OF THE CORNEA.

CHRONIC EXPOSURE- PROLONGED EXPOSURE TO URANIUM MAY PRODUCE CONJUNCTIVITIS, OR THE SYMPTOMS OF RADIATION INJURY, SUCH AS CATARACTS. SEE THE FOLLOWING SECTIONS REGARDING THE EFFECTS OF ALPHA RADIATION ON THE EYES, AND RADIATION SICKNESS.

ALPHA RADIATION:

ACUTE EXPOSURE- RADIATION AFFECTS THE EYE BY INDUCING ACUTE INFLAMMATION OF THE CONJUNCTIVA AND THE CORNEA. THE MOST SENSITIVE PART OF THE EYE IS THE CRYSTALLINE LENS. A LATE EFFECT OF EYE IRRADIATION IS CATARACT FORMATION. IT MAY BEGIN ANYWHERE FROM 6 MONTHS TO SEVERAL YEARS AFTER A SINGLE EXPOSURE. CATARACT FORMATION BEGINS AT THE POSTERIOR POLE OF THE LENS, AND CONTINUES UNTIL THE ENTIRE LENS HAS BEEN AFFECTED. GROWTH OF THE OPACITY MAY STOP AT ANY POINT. THE RATE OF GROWTH AND THE DEGREE OF OPACITY ARE DEPENDENT UPON THE DOSE OF RADIATION.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO ALPHA RADIATION MAY RESULT IN CATARACT FORMATION, AS DESCRIBED ABOVE. OF THE WELL-DOCUMENTED LATE EFFECTS OF RADIATION ON MAN, LEUKEMIA AND CATARACTS HAVE BEEN OBSERVED AT DOSES LOWER THAN THOSE PRODUCING SKIN SCARRING AND CANCER OR BONE TUMORS. THE LENS OF THE EYE SHOULD BE CONSIDERED TO BE A CRITICAL ORGAN.

RADIATION SICKNESS:

THE EYES ARE VERY RADIOSENSITIVE; A SINGLE DOSE OF 100 RADS MAY CAUSE CONJUNCTIVITIS AND KERATITIS.

IT IS UNLIKELY THAT A DOSE SUFFICIENT TO CAUSE RADIATION SICKNESS WOULD OCCUR IF ONLY THE EYES WERE IRRADIATED. HOWEVER, IF EYE DAMAGE BY IONIZING

RADIATION OCCURS, IT MAY BE BEST TO ASSUME THAT OTHER PARTS OF THE BODY HAVE ALSO BEEN CONTAMINATED. SYMPTOMS OF RADIATION SICKNESS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID- REMOVE VICTIM TO A RESTRICTED AREA FOR DECONTAMINATION.

THOROUGHLY WASH EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING THE UPPER AND LOWER LIDS (APPROXIMATELY 15 MINUTES). FOLLOWING THE WATER TREATMENT, PROVIDE AN ISOTONIC SOLUTION. DO NOT USE EYEBATHS, RATHER PROVIDE A CONTINUOUS AND COPIOUS SUPPLY OF FLUID. MONITOR THE VICTIM FOR RADIOACTIVITY. IF ACTIVITY IS PRESENT, REWASH THE EYES, AND REMONITOR UNTIL LITTLE OR NO RADIOACTIVITY IS PRESENT. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 3, PG. 65; IAEA # 47, PG. 35).

!! WARNING!!

ANY WATER USED TO WASH THE VICTIMS EYES MUST BE STORED IN A METAL CONTAINER FOR LATER DISPOSAL. ANY OTHER ARTICLES THAT ARE USED TO DECONTAMINATE THE VICTIM MUST ALSO BE STORED IN METAL CONTAINERS FOR LATER DECONTAMINATION OR DISPOSAL.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #3, PG.65; IAEA # 47, PG. 35).

INGESTION:

URANIUM:

RADIOACTIVE/NEPHROTOXIN.

ACUTE EXPOSURE- FEEDING STUDIES ON ANIMALS INDICATE THAT INSOLUBLE URANIUM IS MUCH LESS TOXIC THAN SOLUBLE URANIUM COMPOUNDS. URANIUM ENTERING THE BLOODSTREAM WILL BECOME STORED IN THE BONE MARROW, BUT THE MAJORITY WILL BECOME LODGED IN THE KIDNEY, WHICH IS THE MAJOR SITE OF TOXICITY. MORE THAN A YEAR AND A HALF IS REQUIRED TO RID THE BODY OF AN ACCIDENTAL HIGH DOSE OF URANIUM, AFTER WHICH TIME MEASURABLE URANIUM IS PRESENT IN THE BONE AND KIDNEY.

CHRONIC EXPOSURE- THE TOXIC ACTION OF URANIUM RESIDES MORE IN ITS CHEMICAL ACTION ON THE RENAL TUBULES, RATHER THAN RADIATION EFFECTS. RATS INJECTED WITH URANIUM METAL IN THE FEMORAL MARROW DEVELOPED SARCOMAS, WHETHER THIS WAS DUE TO METALLOCARCINOGENIC OR RADIOCARCINOGENIC ACTION COULD NOT BE DETERMINED. SEE THE FOLLOWING SECTIONS REGARDING INGESTION OF ALPHA EMITTERS, AND RADIATION SICKNESS. ALSO SEE THE FIRST AID SECTION FOR URANIUM COMPOUNDS.

ALPHA RADIATION:

ACUTE EXPOSURE- THE FATE OF INGESTED ALPHA EMITTERS DEPENDS ON THEIR SOLUBILITY AND VALENCE. HIGH DOSES MAY LEAD TO RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

CHRONIC EXPOSURE- REPEATED INGESTION OF ALPHA EMITTERS MAY LEAD TO RADIATION SICKNESS AS DESCRIBED IN INHALATION EXPOSURE.

RADIATION SICKNESS:

THE SYMPTOMS OF RADIATION SICKNESS DEPENDS UPON THE DOSE RECEIVED. IT MAY RESULT FROM ACUTE OR CHRONIC EXPOSURE TO ANY FORM OF RADIATION. THE SYMPTOMS ARE DESCRIBED IN THE INHALATION SECTION.

FIRST AID FOR URANIUM COMPOUNDS:

ALTHOUGH CHELATING AGENTS ACT ON URANIUM, THEY SHOULD NOT BE USED BECAUSE THE INCREASED MIGRANT FRACTION LEADS THROUGH RENAL PRECIPITATION TO A GREATER KIDNEY BURDEN THAN WOULD BE RECEIVED IF THERE WERE NO TREATMENT AT ALL; THERE IS THUS THE RISK OF SERIOUS TOXIC NEPHRITIS. THE BASIC TREATMENT SHOULD BE ADMINISTRATION OF A BICARBONATED SOLUTION GIVEN LOCALLY AND IN INTRAVENOUS PERFUSION (ONE BOTTLE OF 250 ML AT 1.4 %). FROM IAEA SAFETY SERIES # 47 - MANUAL ON EARLY MEDICAL TREATMENT OF POSSIBLE RADIATION INJURY - 1978. PG. 28.

FIRST AID: IN THE CASE OF INGESTION OF RADIOACTIVE SUBSTANCES, THE MOUTH SHOULD BE RINSED OUT IMMEDIATELY AFTER THE ACCIDENT, CARE BEING TAKEN NOT TO SWALLOW THE WATER USED FOR THIS PURPOSE. VOMITING SHOULD BE INDUCED EITHER MECHANICALLY, OR WITH SYRUP OF IPECAC. DO NOT INDUCE VOMITING IN AN UNCONSCIOUS PERSON. LAVAGE MAY BE USEFUL. CARE SHOULD BE TAKEN TO AVOID ASPIRATION. THE VOMITUS AND LAVAGE FLUIDS SHOULD BE SAVED FOR EXAMINATION AND MONITORING. FURTHER ACTION DEPENDS ON THE NATURE OF THE RADIOACTIVE SUBSTANCE. GET MEDICAL ATTENTION IMMEDIATELY (IAEA # 47, PG.9; IAEA #47, PG.9; IAEA # 3, PP. 59,66).

!!WARNING!!

THE GASTRIC FLUIDS AND FLUIDS USED FOR LAVAGE MUST BE STORED IN METAL CONTAINERS FOR LATER DISPOSAL. THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED, IF NECESSARY, BEFORE BEING TRANSPORTED TO A MEDICAL FACILITY.

ANY PERSONNEL INVOLVED IN RENDERING FIRST AID TO THE VICTIM MUST BE MONITORED FOR RADIOACTIVITY AND DECONTAMINATED IF NECESSARY (IAEA #47, PG.9; IAEA #3, PP. 59,66).

ANTIDOTE:

THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

THERE IS NO ANTIDOTE FOR RADIATION SICKNESS. TREATMENT SHOULD BE SYMPTOMATIC AND SUPPORTATIVE, REGARDLESS OF THE DOSE RECEIVED. IN ALL CASES, MEDICAL ATTENTION SHOULD BE OBTAINED IMMEDIATELY.

REACTIVITY

REACTIVITY:

URANIUM:

CLEAN URANIUM TURNINGS OR CHIPS OXIDIZE READILY IN AIR. IF CONFINED IN A CONTAINER WITHOUT AIR MOVEMENT, THEY CAN IGNITE SPONTANEOUSLY. MOISTURE INCREASES THIS REACTIVITY.

URANIUM TURNINGS STORED IN WATER WILL HYDRIDE AND IGNITE DURING WARM WEATHER

INCOMPATIBILITIES:

URANIUM:

CHLORINE: VIOLENT REACTION

AIR: VIOLENT REACTION
 FLUORINE: VIOLENT REACTION
 NITRIC ACID: REACTS EXPLOSIVELY OR WITH THE FORMATION OF AN EXPLOSIVE SURFACE COATING OR RESIDUE
 NITROGEN OXIDE: IGNITES
 DINITROGEN TETRAOXIDE: EXPLODES OR FORMS AN EXPLOSIVE SURFACE COATING OR RESIDUE
 SELENIUM: REACTS VIOLENTLY OR INCANDESCES
 SULFUR: REACTS VIOLENTLY OR INCANDESCES
 WATER: VIOLENT REACTION HAZARD
 AMMONIA: REACTS VIOLENTLY OR INCANDESCES AT DULL RED HEAT
 BROMIUM TRIFLUORIDE: VIOLENT REACTION
 TRICHLORO ETHYLENE: VIOLENT REACTION
 NITRYL FLUORIDE: VIOLENT REACTION OR GLOWING OR WHITE INCANDESCENCE
 CARBON DIOXIDE: AT 750 C INTERACTION IS SO RAPID THAT IGNITION WILL OCCUR WITH THE FINELY DIVIDED METAL, AND AT 500 C THE MASSIVE METAL WILL IGNITE.
 CARBON TETRACHLORIDE: USE OF A CARBON TETRACHLORIDE FIRE EXTINGUISHER ON A SMALL URANIUM FIRE LED TO AN EXPLOSION.
 CHLORINE: IGNITES AT 150-180 C
 BROMINE VAPOR: IGNITES AT 210-240 C
 IODINE VAPOR: IGNITES AT 260 C
 ACIDS: REACTS WITH LIBERATION OF HYDROGEN AND FORMATION OF SALTS OF TETRAVALENT URANIUM.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC AND/OR HAZARDOUS GASES.

POLYMERIZATION:

NO DATA AVAILABLE.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR. MAY BURN RAPIDLY WITH FLARE-BURNING EFFECT AND RE-IGNITE AFTER FIRE IS EXTINGUISHED.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DO NOT HANDLE PACKAGES WITHOUT FULL PROTECTIVE EQUIPMENT.

OCCUPATIONAL SPILL:

DO NOT TOUCH DAMAGED CONTAINERS OR SPILLED MATERIAL. DAMAGE TO OUTER CONTAINER MAY NOT AFFECT PRIMARY INNER CONTAINER. FOR SMALL LIQUID SPILLS, TAKE UP WITH SAND, EARTH OR OTHER ABSORBENT MATERIAL. FOR LARGE SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AT LEAST 150 FEET UPWIND; GREATER DISTANCES MAY BE NECESSARY IF ADVISED BY QUALIFIED RADIATION AUTHORITY. ISOLATE HAZARD AREA AND DENY ENTRY. ENTER SPILL AREA ONLY TO SAVE LIFE; LIMIT ENTRY TO SHORTEST POSSIBLE TIME. DETAIN UNINJURED PERSONS AND EQUIPMENT EXPOSED TO RADIOACTIVE MATERIAL UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY. DELAY CLEANUP UNTIL ARRIVAL OR INSTRUCTION OF QUALIFIED RADIATION AUTHORITY.

PROTECTIVE EQUIPMENT

VENTILATION:

AT A MINIMUM, PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION. DEPENDING UPON THE SPECIFIC WORKPLACE ACTIVITY AND THE RADIOACTIVITY OF THE ISOTOPE, A MORE STRINGENT VENTILATION SYSTEM MAY BE NECESSARY TO COMPLY WITH EXPOSURE LIMITS SET FORTH BY LAW (10 CFR 20.103)

ONE METHOD OF CONTROLLING EXTERNAL RADIATION EXPOSURE IS TO PROVIDE ADEQUATE SHIELDING. THE ABSORBING MATERIAL USED AND THE THICKNESS REQUIRED TO ATTENUATE THE RADIATION TO ACCEPTABLE LEVELS DEPENDS ON THE TYPE OF RADIATION, ITS ENERGY, THE FLUX AND THE DIMENSIONS OF THE SOURCE.

ALPHA PARTICLES- FOR THE ENERGY RANGE OF ALPHA PARTICLES USUALLY ENCOUNTERED, A FRACTION OF A MILLIMETER OF ANY ORDINARY MATERIAL IS SUFFICIENT FOR ABSORBANCE. THIN RUBBER, ACRYLIC, STOUT PAPER, OR CARDBOARD WILL SUFFICE.

BETA PARTICLES- BETA PARTICLES ARE MORE PENETRATING THAN ALPHA, AND REQUIRE MORE SHEILDING. MATERIALS COMPOSED MOSTLY OF ELEMENTS OF LOW ATOMIC NUMBER SUCH AS ACRYLIC, ALUMINUM AND THICK RUBBER ARE MOST APPROPRIATE FOR THE ABSORPTION OF BETA PARTICLES. FOR EXAMPLE, 1/4 INCH OF ACRYLIC WILL ABSORB ALL BETA PARTICLES UP TO 1 MEV. WITH HIGH ENERGY BETA RADIATION FROM LARGE SOURCES, BREMSSTRAHLUNG (X RAY PRODUCTION) CONTRIBUTION MAY BECOME SIGNIFICANT AND IT MAY BE NECESSARY TO PROVIDE ADDITIONAL SHEILDING OF HIGH ATOMIC WEIGHT MATERIAL, SUCH AS LEAD, TO ATTENUATE THE BREMSSTRAHLUNG RADIATION.

GAMMA RAYS- THE MOST SUITABLE MATERIALS FOR SHIELDING GAMMA RADIATION ARE LEAD AND IRON. THE THICKNESS REQUIRED WILL DEPEND ON WHETHER THE SOURCE IS PRODUCING NARROW OR BROAD BEAM RADIATION. PRIMARY AND SECONDARY PROTECTIVE BARRIERS MAY BE REQUIRED TO BLOCK ALL RADIATION.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

URANIUM, INSOLUBLE COMPOUNDS (AS U):

AT ANY DETECTABLE CONCENTRATION:

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.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

DISPOSABLE OVERGARMENTS, INCLUDING HEAD COVERINGS AND FOOT COVERING, SHOULD BE WORN BY ANY EMPLOYEE ENGAGED IN HANDLING ANY RADIOACTIVE SUBSTANCE. THESE GARMENTS ARE ALSO RECOMMENDED EVEN IF THE EMPLOYEE IS WORKING WITH A "GLOVE BOX" CONTAINMENT SYSTEM. CERTAIN CLOTHING FIBERS MAY BE USEFUL IN DOSIMETRY SO CLOTHING SHOULD BE KEPT.

IN THE EVENT OF AN ACCIDENT, LARGE SCALE RELEASE OR A LARGE SCALE CLEAN-UP FULL PROTECTIVE CLOTHING WILL BE NECESSARY.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

WARNING!

USED GLOVES MAY PRESENT A RADIATION HAZARD AND SHOULD BE DISPOSED OF AS RADIOACTIVE WASTE.

EYE PROTECTION:

EMPLOYEE MUST WEAR APPROPRIATE EYE PROTECTION THAT WILL NOT ALLOW THE INTRODUCTION OF PARTICLES INTO THE EYES. CONTACT LENSES SHOULD NOT BE WORN.

CLOTHING, GLOVE, AND EYE PROTECTION EQUIPMENT WILL PROVIDE PROTECTION AGAINST ALPHA PARTICLES, AND SOME PROTECTION AGAINST BETA PARTICLES, DEPENDING ON THICKNESS, BUT WILL NOT SHIELD GAMMA RADIATION.

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CREATION DATE: 09/23/86 REVISION DATE: 02/25/92

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XYLENE MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS25150

CAS#: 1330-20-7 FORMULA: C₈H₁₀

XYLENE IS A COLORLESS OR LIGHT-COLORED LIQUID WITH A PLEASANT ODOR.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT: 81 F (27 C). DANGEROUS FIRE HAZARD. VAPOR-AIR MIXTURES MAY BE EXPLOSIVE. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. FUMES MAY TRAVEL ALONG THE GROUND TO A FIRE SOURCE AND FLASH BACK. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

FOR SMALL FIRES: USE DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY, OR STANDARD FOAM.

FOR LARGE FIRES: USE WATER SPRAY, FOG OR REGULAR FOAM.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, AND SKIN AND SEVERE IRRITATION OF THE EYES WITH TEARING. ADDITIONAL EFFECTS MAY INCLUDE DRUNKENNESS, DIFFICULTY BREATHING, HEADACHE, TWITCHING, BLURRED VISION, DROOLING, NAUSEA, VOMITING, ABDOMINAL PAIN, UNCONSCIOUSNESS, LUNG CONGESTION, AND POSSIBLE DEATH. DRINKING ALCOHOL MAY WORSEN THE EFFECTS.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, REDNESS AND SWELLING OF THE EYES MAY OCCUR. MAY CAUSE REPRODUCTIVE EFFECTS.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SPILL OR LEAK:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AND RESTRICT ENTRY.

CERCLA REPORTABLE QUANTITY: 1000 POUND(S).

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY

PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.
FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000
OHS25150
1330-20-7
XYLENE

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OHS25150

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 1330-20-7
RTECS NUMBER: ZE2100000

SUBSTANCE: XYLENE

TRADE NAMES/SYNONYMS:

BENZENE, DIMETHYL-; DILAN; DIMETHYLBENZENE; XYLOL;
HUMISEAL THINNER NO.33 (HUMISEAL DIV.);
HUMISEAL THINNER NO.SP 420 (HUMISEAL DIV.);
SOLVESSO XYLENE (HUMBLE OIL AND REFINING COMPANY);
TT-X-9166 REDUCER (ADVANCED COATINGS AND CHEMICALS);
DYNACHEM (R) DEVELOPER DCR (THIOL/DYNACHEM CORPORATION);
THINNER 2000 (KOP-COAT); SOL 9050 XYLENE (CHEMTECH INDUSTRIES, INC.);
HUMISEAL THINNER NO. 521 (M.W. RIEDEL AND COMPANY);
NEGATIVE TYPE DEVELOPING SOLUTION (GC ELECTRONICS); RCRA U239; STCC 4904350;
UN 1307; C8H10; ULTRADEL R750 RINSE SOLUTION; OHS25150

CHEMICAL FAMILY:
HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C6-H4-(C-H3)2

MOLECULAR WEIGHT: 106.16

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=3 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: XYLENE (O-, M-, P-ISOMERS)
CAS# 1330-20-7

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

XYLENE:

100 PPM (434 MG/M3) OSHA TWA; 150 PPM (651 MG/M3) OSHA STEL
100 PPM (434 MG/M3) ACGIH TWA; 150 PPM (651 MG/M3) ACGIH STEL
100 PPM (434 MG/M3) NIOSH RECOMMENDED TWA;
150 PPM (651 MG/M3) NIOSH RECOMMENDED STEL
100 PPM (434 MG/M3) DFG MAK TWA;
200 PPM (868 MG/M3) DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 4 TIMES/SHIFT

MEASUREMENT METHOD: CHARCOAL TUBE; CARBON DISULFIDE; GAS CHROMATOGRAPHY WITH FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1501, AROMATIC HYDROCARBONS).

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: LIGHT COLORED OR COLORLESS MOBILE LIQUID WITH AN AROMATIC

ODOR. BOILING POINT: 280-291 F (138-144 C)

MELTING POINT: -54-55 F (-48-13 C) SPECIFIC GRAVITY: 0.8611-0.8802

VOLATILITY: 100% VAPOR PRESSURE: 7-9 MMHG @ 20 C

EVAPORATION RATE: (BUTYL ACETATE = 1) 0.6 SOLUBILITY IN WATER: 0.00003%

ODOR THRESHOLD: 0.3 PPM VAPOR DENSITY: 3.7

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ETHER, ACETONE, PETROLEUM ETHER,
BENZENE, CARBON TETRACHLORIDE, ORGANIC SOLVENTS.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY
GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE
OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: 81-90 F (27-32 C) (CC) UPPER EXPLOSIVE LIMIT: 7.0%

LOWER EXPLOSIVE LIMIT: 1.0% AUTOIGNITION TEMP.: 867-984 F (464-529 C)

FLAMMABILITY CLASS(OSHA): IC

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING

WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG, SOLID STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND.

WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991)

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.119
EXCEPTIONS: 49 CFR 173.118

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
XYLENES-UN 1307

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202

BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

XYLENE:

IRRITATION DATA: 200 PPM EYE-HUMAN; 87 MG EYE-RABBIT MILD; 5 MG/24 HOURS EYE-RABBIT SEVERE; 100% SKIN-RABBIT MODERATE; 500 MG/24 HOURS SKIN-RABBIT MODERATE.

TOXICITY DATA: 10000 PPM/6 HOURS INHALATION-MAN LCLO; 200 PPM INHALATION-HUMAN TCLO; 5000 PPM/4 HOURS INHALATION-RAT LC50; 450 PPM INHALATION-GUINEA PIG LCLO; 50 MG/KG ORAL-HUMAN LDLO; 4300 MG/KG ORAL-RAT LD50; 1700 MG/KG SUBCUTANEOUS-RAT LD50; 129 MG/KG INTRAVENOUS-RABBIT LDLO; 2 GM/KG INTRAPERITONEAL-MAMMAL LDLO; 2459 MG/KG INTRAPERITONEAL-RAT LD50; 1548 MG/KG INTRAPERITONEAL-MOUSE LD50; 2000 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; REPRODUCTIVE EFFECTS DATA (RTECS), (DPIRDU), (85IFAI), (38MKAJ).

CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL INADEQUATE EVIDENCE, (IARC GROUP-3).

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.

ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION, INGESTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY ALSO AFFECT THE NERVOUS SYSTEM, LIVER AND KIDNEYS.

AT INCREASED RISK FROM EXPOSURE: PREGNANT WOMEN.

ADDITIONAL DATA: ALCOHOL MAY ENHANCE THE TOXIC EFFECTS. STIMULANTS SUCH AS EPINEPHRINE OR EPHEDRINE MAY INDUCE VENTRICULAR FIBRILLATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:

XYLENE:

IRRITANT/NARCOTIC. 1000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- IRRITATION OF THE UPPER RESPIRATORY TRACT MAY OCCUR AT 200 PPM. EXPOSURE TO HIGHER CONCENTRATIONS MAY CAUSE MORE SEVERE IRRITATION AND INITIAL CENTRAL NERVOUS SYSTEM EXCITATION FOLLOWED BY DEPRESSION. SIGNS AND SYMPTOMS MAY INCLUDE RESPIRATORY DIFFICULTY AND SUBSTERNAL PAIN, TRANSIENT EUPHORIA AND EMOTIONAL LABILITY, HEADACHE, NAUSEA, VOMITING, ANOREXIA, ABDOMINAL PAIN, DIZZINESS, DROWSINESS, ATAXIA, AND STAGGERING. THERE MAY BE SALIVATION, SLURRED SPEECH, BLURRED VISION, NYSTAGMUS, TINNITUS, TREMORS, CONFUSION, AND FLUSHING OF THE FACE AND A FEELING OF INCREASED BODY HEAT. IN SEVERE EXPOSURES, THERE MAY BE STUPOR, ANESTHESIA, UNCONSCIOUSNESS, AND COMA WHICH MAY BE PUNCTUATED BY EPISODES OF NEUROIRRITABILITY, BUT RARELY FRANK CONVULSIONS, EXCEPT IN TERMINAL ASPHYXIA. LIVER AND KIDNEY DAMAGE MAY OCCUR, BUT ARE USUALLY MILD AND TRANSIENT. A GROUP OF SUBJECTS WHO INHALED 12.3 UMOL/L OF XYLENE WHILE EXERCISING BECAME SIGNIFICANTLY IMPAIRED ON 3 NEUROPSYCHOLOGICAL TESTS. EXPOSURE OF 3 PAINTERS TO APPROXIMATELY 10,000 PPM FOR 18.5 HOURS RESULTED IN 1 DEATH FROM PULMONARY EDEMA AND PETECHIAL BRAIN HEMORRHAGE. BOTH SURVIVORS WERE UNCONSCIOUS FOR 19-24 HOURS AND EXPERIENCED RETROGRADE AMNESIA, HYPOTHERMIA, AND LUNG CONGESTION. RENAL

AND HEPATIC IMPAIRMENT ALSO DEVELOPED. COMPLETE RECOVERY TOOK 15 DAYS. HIGH CONCENTRATIONS MAY CAUSE DEATH FROM SUDDEN VENTRICULAR FIBRILLATION, BUT MORE FREQUENTLY DEATH OCCURS FROM RESPIRATORY ARREST.

CHRONIC EXPOSURE- REPEATED OR PROLONGED INHALATION OF VAPORS ABOVE 200 PPM MAY CAUSE NAUSEA, VOMITING, ABDOMINAL PAIN, AND ANOREXIA. OTHER COMMON COMPLAINTS INCLUDE HEADACHE, FATIGUE, LASSITUDE, IRRITABILITY, BREATHING DIFFICULTIES, AND FLATULENCE. EFFECTS ON THE NERVOUS SYSTEM MAY RESULT IN EXCITATION, FOLLOWED BY DEPRESSION, PARESTHESIAS, TREMORS, APPREHENSION, IMPAIRED MEMORY, INSOMNIA, VERTIGO, AND TINNITUS. EFFECTS ON REACTION TIME, MANUAL COORDINATION, BODY BALANCE AND EEG OCCURRED WITH REPEATED EXPOSURE TO 90 PPM OF M-XYLENE. SWEETISH TASTE IN THE MOUTH, DRY NOSE AND THROAT, STRONG THIRST, MUCOSAL HEMORRHAGE, AND ANEMIA HAVE BEEN REPORTED. EFFECTS ON THE LIVER, KIDNEY, CARDIOVASCULAR SYSTEM, AND THE BONE MARROW HAVE ALSO BEEN REPORTED, ALTHOUGH THE LATTER HAS BEEN QUESTIONED. EXPOSURE OF RABBITS TO 1150 PPM FOR 40-55 DAYS RESULTED IN A REVERSIBLE DECREASE IN THE RED AND WHITE CELL COUNTS AND AN INCREASE IN THE PLATELETS. ONE CASE OF AN APPARENT EPILEPTIFORM SEIZURE FOLLOWING A RELATIVELY BRIEF EXPOSURE HAS OCCURRED. WOMEN MAY DEVELOP MENSTRUAL DISORDERS, SUCH AS MENORRHAGIA OR METRORRHAGIA, INFERTILITY, AND PATHOLOGICAL PREGNANCY CONDITIONS INCLUDING TOXICOSIS, DANGER OF MISCARRIAGE, AND HEMORRHAGING DURING DELIVERY. REPEATED EXPOSURE OF PREGNANT MICE, RATS AND RABBITS TO THE INDIVIDUAL OR THE MIXED ISOMERS HAS RESULTED IN MATERNAL EFFECTS AND EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, AND SPECIFIC DEVELOPMENTAL ABNORMALITIES. INCLUDED AMONG THESE EFFECTS ARE FETAL DEATH, FETOTOXICITY, PRE- AND POST-IMPLANTATION MORTALITY, ABORTION, CRANIOFACIAL AND MUSCULOSKELETAL ABNORMALITIES, AND EXTRA EMBRYONIC STRUCTURES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

XYLENE:

IRRITANT.

ACUTE EXPOSURE- LIQUID XYLENE IS A DEFATTING AGENT AND MAY CAUSE A BURNING SENSATION, DRYING, VASODILATION, ERYTHEMA, AND POSSIBLY BLISTERING. THE LIQUID IS READILY ABSORBED THROUGH INTACT OR BROKEN SKIN AT A RATE OF APPROXIMATELY 4-10 MG/CM²/HOUR, BUT SYSTEMIC EFFECTS HAVE NOT BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DEFATTING OF THE SKIN WITH DRYING, ERYTHEMA, CRACKING, THICKENING AND BLISTERING. REPEATED APPLICATION OF 95% XYLENE TO RABBIT SKIN CAUSED MODERATE TO MARKED IRRITATION WITH ERYTHEMA AND MODERATE NECROSIS. ONE CASE OF ALLERGIC CONTACT URTICARIA HAS BEEN REPORTED.

FIRST AID- 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.

EYE CONTACT:

XYLENE:

IRRITANT.

ACUTE EXPOSURE- 200 PPM HAS CAUSED CONJUNCTIVAL IRRITATION IN HUMANS; AT HIGHER CONCENTRATIONS, IRRITATION MAY BE SEVERE. VAPOR EXPOSURE HAS ALSO CAUSED TEARING AND PHOTOPHOBIA. AN ACCIDENTAL SPLASH IN THE HUMAN EYE CAUSED TRANSIENT SUPERFICIAL DAMAGE WITH RAPID RECOVERY, ALTHOUGH REVERSIBLE CORNEAL BURNS HAVE ALSO BEEN REPORTED.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO HIGH VAPOR CONCENTRATIONS MAY CAUSE A BURNING SENSATION, CONJUNCTIVITIS AND BLURRED VISION; REVERSIBLE VACUOLAR, EPITHELIAL KERATOPATHY HAS BEEN REPORTED IN SOME WORKERS.

FIRST AID- WASH 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.

INGESTION:

XYLENE:

NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE A BURNING SENSATION IN THE MOUTH AND STOMACH, SALIVATION, SEVERE GASTROINTESTINAL DISTRESS WITH NAUSEA AND VOMITING, POSSIBLY HEMATEMESIS, AND TOXIC EFFECTS INCLUDING SIGNS OF CENTRAL NERVOUS SYSTEM DEPRESSION AND OTHER SYMPTOMS AS IN ACUTE INHALATION, INCLUDING VENTRICULAR FIBRILLATION AND LIVER AND KIDNEY INJURY. INGESTION OF SMALL QUANTITIES OF 90% XYLENE PLUS TOLUENE PRODUCED URINARY DEXTROSE AND UROBILINOGEN EXCRETION WITH TOXIC HEPATITIS, WHICH WAS REVERSIBLE IN 20 DAYS. A DOSE OF 15-30 MILLILITERS (ABOUT 1/2-1 OUNCE) IS THE EXPECTED HUMAN LETHAL DOSE. WITH ASPIRATION OF EVEN A FEW MILLILITERS INTO THE LUNGS, SEVERE COUGHING, DISTRESS, CHEMICAL PNEUMONITIS, RAPIDLY DEVELOPING PULMONARY EDEMA, AND HEMORRHAGE MAY OCCUR.

CHRONIC EXPOSURE- NO DATA AVAILABLE ON THE ORTHO-ISOMER. REPEATED INGESTION OF THE MIXED, META-, OR PARA-ISOMERS BY PREGNANT MICE RESULTED IN EFFECTS ON FERTILITY, ON THE EMBRYO OR FETUS, OR SPECIFIC DEVELOPMENTAL ABNORMALITIES. INCLUDED AMONG THESE EFFECTS WERE FETOTOXICITY, LITTER SIZE, CRANIOFACIAL AND MUSCULOSKELETAL SYSTEM ABNORMALITIES, AND POST-IMPLANTATION MORTALITY.

FIRST AID- EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IN PLACE TO PREVENT FURTHER ASPIRATION SHOULD BE DONE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, EMESIS CAN ALSO BE INDUCED USING SYRUP OF IPECAC WITHOUT INCREASING THE HAZARD OF ASPIRATION (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

XYLENE:

NITRIC ACID: EXOTHERMIC REACTION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
PLASTICS, RUBBER, COATINGS: MAY BE ATTACKED.
SULFURIC ACID: EXOTHERMIC REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

PROTECT AGAINST PHYSICAL DAMAGE. OUTSIDE OR DETACHED STORAGE IS PREFERABLE. INSIDE STORAGE SHOULD BE IN A STANDARD FLAMMABLE LIQUIDS STORAGE ROOM OR CABINET. SEPARATE FROM OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U239.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE IN HEAT OF FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

IMMOBILIZE SPILL WITH UNIVERSAL GELLING AGENT.

REDUCE VAPOR AND FIRE HAZARD WITH APPROPRIATE FOAM.

AIR SPILL:

KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:

LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL BOOMS.

APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT.

APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL.

IF DISSOLVED, AT A CONCENTRATION OF 10 PPM OR GREATER, APPLY ACTIVATED CARBON AT TEN TIMES THE AMOUNT THAT HAS BEEN SPILLED.

USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND RESTRICT ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

XYLENE (O-, M-, AND P-ISOMERS):

1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 11/14/84 REVISION DATE: 02/25/92

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YTTRIUM MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS25180

CAS#: 7440-65-5 FORMULA: Y

YTTRIUM IS A GRAY SOLID.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: MAY CAUSE IRRITATION OF THE NOSE, THROAT, AND EYES WITH POSSIBLE DAMAGE. ADDITIONAL EFFECTS MAY INCLUDE LUNG DAMAGE.

LONG TERM EXPOSURE: MAY CAUSE LIVER DAMAGE.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS25180
7440-65-5
YTTRIUM

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OHS25180

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: YTTRIUM

CAS NUMBER: 7440-65-5
RTECS NUMBER: ZG2980000

TRADE NAMES/SYNONYMS:
YTTRIUM METALLIC; YTTRIUM-89; OHS25180

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: Y

MOLECULAR WEIGHT: 88.90

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: YTTRIUM
CAS# 7440-65-5

PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
YTTRIUM AND COMPOUNDS (AS Y):
1 MG/M3 OSHA TWA
1 MG/M3 ACGIH TWA
1 MG/M3 NIOSH RECOMMENDED TWA
5 MG/M3 DFG MAK TWA (TOTAL DUST);
50 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; INDUCTIVELY COUPLED PLASMA;
(NIOSH VOL. III # 7300, ELEMENTS).

PHYSICAL DATA

DESCRIPTION: IRON-GRAY LUSTROUS POWDER; DARKENS ON EXPOSURE TO LIGHT

BOILING POINT: 5300 F (2927 C) MELTING POINT: 2748 F (1509 C)

SPECIFIC GRAVITY: 4.472 SOLUBILITY IN WATER: DECOMPOSES

SOLVENT SOLUBILITY: DILUTE ALKALIES, HOT POTASSIUM HYDROXIDE, DILUTE ACID

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FLASH POINT: FLAMMABLE (DUST)

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:

*FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:

*FLAMMABLE SOLID

*HAZARD CLASSIFICATION AND LABEL APPLY TO DUST AND POWDER FORM ONLY.

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.154

EXCEPTIONS: 49 CFR 173.153

TOXICITY

YTTRIUM:

CARCINOGEN STATUS: NONE.

THE TOXICOLOGICAL PROPERTIES OF YTTRIUM HAVE NOT BEEN FULLY QUANTIFIED. IT IS AN EYE AND MUCOU MEMBRANE IRRITANT.

HEALTH EFFECTS AND FIRST AID

INHALATION:

YTTRIUM:

IRRITANT.

ACUTE EXPOSURE- INHALATION OF YTTRIUM AND YTTRIUM COMPOUNDS MAY IRRITATE THE RESPIRATORY TRACT AND CAUSE LUNG DAMAGE.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

YTTRIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- 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.

EYE CONTACT:

YTTRIUM:

IRRITANT.

ACUTE EXPOSURE- YTTRIUM AND YTTRIUM COMPOUNDS MAY CAUSE IRRITATION AND POSSIBLY SEVERE DAMAGE.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

YTTRIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.

CHRONIC EXPOSURE- NO HUMAN DATA AVAILABLE. ANIMAL STUDIES INDICATE THAT PROLONGED INGESTION MAY CAUSE LIVER DAMAGE.

FIRST AID- IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2 TO 4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

YTTRIUM:

NO DATA AVAILABLE.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND IRRITATING FUMES OF YTTRIUM OXIDE.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

CONDITIONS TO AVOID

AVOID DISPERSION OF DUST IN AIR. FINELY DIVIDED PARTICLES, DUST, OR FUMES MAY BE FLAMMABLE OR EXPLOSIVE. KEEP AWAY FROM SPARKS OR IGNITION SOURCES.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH SPILLED MATERIAL INTO SEWER. KEEP UNNECESSARY PEOPLE AWAY.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

YTTRIUM:

- 5 MG(Y)/M3- DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE RESPIRATORS.
- 10 MG(Y)/M3- DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND QUARTER-MASK RESPIRATORS.
SUPPLIED-AIR RESPIRATOR.
SELF-CONTAINED BREATHING APPARATUS.
- 25 MG(Y)/M3- POWERED AIR-PURIFYING RESPIRATOR WITH DUST AND MIST FILTER.
SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
- 50 MG(Y)/M3- AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH HIGH-EFFICIENCY PARTICULATE FILTER.
POWERED AIR-PURIFYING RESPIRATOR WITH TIGHT-FITTING FACEPIECE AND HIGH-EFFICIENCY PARTICULATE FILTER.
SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.
SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE.
SUPPLIED-AIR RESPIRATOR WITH TIGHT-FITTING FACEPIECE OPERATED IN CONTINUOUS FLOW MODE.
- 500 MG(Y)/M3- SUPPLIED-AIR RESPIRATOR WITH HALF-MASK AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
- 1000 MG(Y)/M3- SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
- ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH HIGH-EFFICIENCY PARTICULATE FILTER.
ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 06/02/86 REVISION DATE: 05/03/91

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ZINC MSDS SUMMARY SHEET
TO BE USED WITH MSDS NUMBER OHS25229

CAS#: 7440-66-6 FORMULA: ZN

ZINC IS AN ODORLESS, BLUISH-WHITE METAL.

EXPOSURE LIMITS:

THIS SUBSTANCE REGULATED BY OSHA AND/OR ACGIH. SEE MSDS.

FIRE AND EXPLOSION HAZARDS:

NO FIRE HAZARD. NO FIRE HAZARD IN METAL FORM; HOWEVER, DANGEROUS FIRE HAZARD IN DUST, POWDER, OR FUME FORM. NEVER SMOKE OR USE NEAR AN OPEN FLAME OR SPARKS. IF IT CATCHES FIRE, DO NOT TRY TO STOP THE FIRE YOURSELF. SEEK THE HELP OF FIREFIGHTING PERSONNEL. CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

HEALTH AND FIRST AID:

SHORT TERM EXPOSURE: DUST MAY CAUSE IRRITATION OF THE NOSE, THROAT, SKIN, AND EYES WITH TEARING. ADDITIONAL EFFECTS MAY INCLUDE HEADACHE, NAUSEA, STOMACH PAIN, VOMITING BLOOD, DIARRHEA, THIRST, COUGHING, SNEEZING, CHILLS, SWEATING, FEVER, INCOORDINATION, MUSCLE PAIN, TREMOR, BLUISH COLOR OF THE SKIN, LIPS, AND FINGERNAILS, COLDNESS, FAINTING, DIFFICULTY BREATHING, AND KIDNEY FAILURE.

LONG TERM EXPOSURE: IN ADDITION TO EFFECTS FROM SHORT TERM EXPOSURE, NERVE, BLOOD, AND PANCREATIC EFFECTS MAY OCCUR.

FIRST AID: IF SOMEONE IS OVERCOME BY THIS SUBSTANCE, MOVE THEM IMMEDIATELY TO FRESH AIR AND ADMINISTER ARTIFICIAL RESPIRATION/CPR. REMOVE ANY WET CLOTHING OR SHOES. WASH EXPOSED PARTS WITH WATER AND SOAP. FLUSH EYES WITH WATER FOR FIFTEEN MINUTES. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS. GET MEDICAL ATTENTION IMMEDIATELY. SEE MSDS FOR FURTHER RECOMMENDATIONS.

REACTIVITY:

MAY REACT DANGEROUSLY WITH WATER. MAY REACT DANGEROUSLY WITH OXIDIZERS AND OTHER CHEMICALS. SEE MSDS FOR COMPLETE LISTING.

SAFETY STEPS AND PROTECTIVE EQUIPMENT:

YOU SHOULD WEAR PROTECTIVE CLOTHING, GLOVES, AND SAFETY GOGGLES. A RESPIRATOR MAY BE NEEDED WHEN WORKING IN HIGH OR UNKNOWN CONCENTRATIONS. SEE MSDS FOR OSHA/NIOSH RECOMMENDATIONS. IF AN ACCIDENT OCCURS, CONTACT SAFETY PERSONNEL.

OCCUPATIONAL HEALTH SERVICES, INC.

FOR EMERGENCY SOURCE INFORMATION CONTACT: (615) 366-2000

OHS25229

7440-66-6

ZINC

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OHS25229

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

SUBSTANCE: ZINC

CAS NUMBER: 7440-66-6
RTECS NUMBER: ZG8600000

TRADE NAMES/SYNONYMS:

ZINC ELEMENT; ZINC METAL; ZINC DUST; ZINC POWDER; BLUE POWDER;
GRANULAR ZINC; UN 1436; ZN; OHS25229

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: ZN

MOLECULAR WEIGHT: 65.38

CERCLA RATINGS (SCALE 0-3): HEALTH=0 FIRE=3 REACTIVITY=1 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=0 FIRE=1 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: ZINC
CAS# 7440-66-6

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ZINC OXIDE:

5 MG/M3 OSHA TWA (RESPIRABLE FRACTION); 10 MG/M3 OSHA TWA (TOTAL DUST)
5 MG/M3 OSHA TWA (FUME); 10 MG/M3 OSHA STEL (FUME)
10 MG/M3 ACGIH TWA (DUST);
5 MG/M3 ACGIH TWA (FUME); 10 MG/M3 ACGIH STEL (FUME)
5 MG/M3 NIOSH RECOMMENDED TWA (DUST);
15 MG/M3 NIOSH RECOMMENDED CEILING (DUST)
5 MG/M3 NIOSH RECOMMENDED TWA (FUME); 10 MG/M3 NIOSH RECOMMENDED STEL (FUME)
5 MG/M3 DFG MAK TWA (FINE DUST) (FUME);
50 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT (FUME)

MEASUREMENT METHOD: PARTICULATE FILTER; X-RAY DIFFRACTION SPECTROMETRY;
(NIOSH VOL. III # 7502).

ZINC:

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY.
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING.

PHYSICAL DATA

DESCRIPTION: ODORLESS, BLUISH-WHITE METAL OR POWDER WHICH MAY FORM A WHITE
CARBONATE COATING ON EXPOSURE TO MOIST AIR. BOILING POINT: 1665 F (907 C)
MELTING POINT: 788 F (420 C) SPECIFIC GRAVITY: 7.14
VAPOR PRESSURE: 1 MMHG @ 487 C SOLUBILITY IN WATER: REACTS
AUTOIGNITION TEMPERATURE: 1256 F (680 C) (CLOUD); 860 F (460 C) (LAYER)
MOHS' HARDNESS: 2.5

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE
FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

FINELY DIVIDED MATERIAL MAY IGNITE ON EXPOSURE TO AIR.

LOWER EXPLOSIVE LIMIT: 0.5 OZ/FT3

FIREFIGHTING MEDIA:
USE DRY CHEMICAL, SODA ASH, LIME OR SAND. DO NOT USE WATER OR FOAM.
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
USE WATER SPRAY TO REDUCE VAPOR; DO NOT GET WATER INSIDE CONTAINER. 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 (1990 EMERGENCY RESPONSE
GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 76).

EXTINGUISH USING AGENTS INDICATED. DO NOT ALLOW WATER TO CONTACT BURNING
MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE SOLID AND DANGEROUS WHEN WET

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.220
EXCEPTIONS: 49 CFR 173.153

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
ZINC POWDER-UN 1436

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.3 - DANGEROUS WHEN WET MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG I

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
DANGEROUS WHEN WET, SPONTANEOUSLY COMBUSTIBLE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.211
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 15 KG

TOXICITY

ZINC:
IRRITATION DATA: 300 UG/3 DAYS INTERMITTENT SKIN-HUMAN MILD.
TOXICITY DATA: 124 MG/M3/50 MINUTES INHALATION-HUMAN TCLO.
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.
TARGET EFFECTS: POISONING MAY AFFECT THE GASTROINTESTINAL TRACT, LUNGS,
CENTRAL NERVOUS SYSTEM, HEMATOPOIETIC SYSTEM, AND BONES.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH SKIN DISORDERS OR IMPAIRED
RESPIRATORY FUNCTION.
ADDITIONAL DATA: EXCESSIVE ZINC INTAKE HAS BEEN ASSOCIATED WITH A
COPPER-DEFICIENCY ANEMIA.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ZINC:

ACUTE EXPOSURE- INHALATION OF DUST MAY CAUSE IRRITATION WITH DIFFICULTY IN

BREATHING AND SNEEZING. NEUROLOGICAL AND PSYCHIATRIC SYMPTOMOLOGY INCLUDING IRRITABILITY, UPPER EXTREMITY COARSE INTENTION TREMOR, INCOORDINATION, AND ATAXIA HAVE ALSO BEEN REPORTED. METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED METAL OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST, AND A SWEET, METALLIC, OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE, AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY, PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA, AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS.

CHRONIC EXPOSURE- SEVERE GASTROINTESTINAL DISTURBANCES AND HYPOCHROMIC ANEMIA HAVE BEEN REPORTED, BUT OTHER CHEMICALS MAY HAVE CONTRIBUTED TO THE EFFECTS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ZINC:

ACUTE EXPOSURE- DUST MAY CAUSE MECHANICAL IRRITATION AND MILD DERMATITIS IN INTERTRIGINOUS AREAS.

CHRONIC EXPOSURE- 300 UG APPLIED TO HUMAN SKIN INTERMITTENTLY FOR 3 DAYS CAUSED MILD IRRITATION. ALLERGIC REACTIONS ARE RARE, BUT HAVE BEEN REPORTED.

FIRST AID- 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.

EYE CONTACT:

ZINC:

ACUTE EXPOSURE- DUST MAY CAUSE MECHANICAL IRRITATION OR INJURY TO THE SURFACE OF THE EYE, WITH DISCOMFORT, REDDENING, AND TEARING.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

ZINC:

ACUTE EXPOSURE- LARGE ORAL DOSES MAY CAUSE GASTROINTESTINAL DISTRESS WITH STOMACH CRAMPS, DEHYDRATION, ELECTROLYTE IMBALANCE, ABDOMINAL PAIN, NAUSEA, VOMITING, HEMATEMESIS, DIARRHEA, LETHARGY, IMMUNE SYSTEM EFFECTS, FEVER, DIZZINESS, TIGHTNESS IN THE THROAT, SHOCK, COLLAPSE, RENAL FAILURE, AND DEATH. SURVIVORS MAY HAVE RESIDUAL NEPHRITIS AND STRICTURES OF THE ESOPHAGUS AND PYLORIC END OF THE STOMACH.

CHRONIC EXPOSURE- PATIENTS TAKING ZINC IN AMOUNTS 10 TIMES THE RDA FOR MONTHS AND YEARS HAVE NOT SHOWN ANY ADVERSE REACTIONS. EXCESSIVE ABSORPTION MAY CAUSE COPPER-DEFICIENCY ANEMIA. INGESTION OF APPROXIMATELY 85.7 MG/KG/DAY FOR 2 DAYS CAUSED LETHARGY, LIGHTEADEDNESS, STAGGERING, AND DIFFICULTY IN WRITING CLEARLY. 2 PEOPLE WHO INGESTED 40 PPM IN DRINKING WATER FOR SEVERAL MONTHS EXPERIENCED LACK OF CONCENTRATION, DROWSINESS, MENTAL AND PHYSICAL FATIGUE, PAIN IN THE ARMS AND LEGS, HEADACHE, STIFFNESS, MUSCLE PAINS, LOSS OF APPETITE, NAUSEA, WEIGHT LOSS, AND LASSITUDE. 90 PPM IN THE DIET FOR 5 WEEKS HAS RESULTED IN A DECREASE IN THE HDL CHOLESTEROL LEVEL. PANCREATIC ABNORMALITIES HAVE ALSO BEEN OBSERVED. A DIET OF 0.25% IN RATS CAUSED NO INJURY; ABOVE 0.25% THERE WAS BREAKDOWN OF THE HOMEOSTATIC MECHANISM, GROWTH RETARDATION, HYPOCHROMIC ANEMIA, AND DEFECTIVE MINERALIZATION OF THE BONES. MICE FED 500 PPM FOR 14 MONTHS EXHIBITED HYPERTROPHY OF THE ADRENAL CORTEX AND CHANGES INDICATING HYPERACTIVITY OF THE PANCREATIC ISLETS AND PITUITARY GLAND; 30,000 PPM FOR 13 WEEKS CAUSED LIVER AND KIDNEY DAMAGE AND SOME DEATHS. COWS FED 2% FOR 2 DAYS DEVELOPED SEVERE ENTERITIS, WITH 7 OF 40 DYING. SEVERE PULMONARY EMPHYSEMA AND CHANGES IN THE MYOCARDIUM, KIDNEYS, AND LIVER WERE OBSERVED. PIGS FED >1000 PPM HAD REDUCED FOOD INTAKE AND WEIGHT GAIN; AT >2000 PPM, DEATH OCCURRED AFTER 2 WEEKS. BONE CHANGES WERE OBSERVED IN FOALS FED 5400 PPM. HIGH DIETARY LEVELS OF ZINC HAVE BEEN ASSOCIATED WITH REDUCED FETAL WEIGHTS, ALTERED CONCENTRATIONS OF FETAL IRON AND COPPER, AND ALOPECIA AND REDUCED GROWTH OF OFFSPRING IN ANIMALS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

POISONING FROM ZINC SALTS:

GIVE CALCIUM DISODIUM EDETATE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.

FOR INTRAMUSCULAR ADMINISTRATION, GIVE 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:

ZINC POWDER OR DUST EVOLVES HIGHLY FLAMMABLE HYDROGEN GAS ON CONTACT WITH WATER; THE HEAT OF THE REACTION MAY BE SUFFICIENT TO IGNITE THE HYDROGEN. ZINC FOIL MAY IGNITE IN THE PRESENCE OF MOISTURE.

INCOMPATIBILITIES:

ZINC:

ACIDS: EVOLVES HYDROGEN GAS WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION
 ALKALIES: EVOLVES HYDROGEN GAS WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION.

ALUMINUM (POWDER): POSSIBLE IGNITION.

ALUMINUM-MAGNESIUM ALLOY + RUSTED STEEL: MAY SPARK ON IMPACT.

AMMONIUM NITRATE: VIOLENT REACTION OR FORMATION OF EXPLOSIVE MIXTURE.

AMMONIUM SULFIDE: MAY EXPLODE IN A CLOSED CONTAINER.

ARSENIC: INCANDESCENT REACTION WHEN HEATED.

ARSENIC TRIOXIDE: EXPLOSIVE REACTION ON HEATING.

BROMOMETHANE: FORMS FLAMMABLE COMPOUNDS.

CADMIUM: INCANDESCENT REACTION.

CALCIUM CHLORIDE: EVOLVES HYDROGEN GAS WHICH MAY BE IGNITED BY THE HEAT OF THE REACTION.

CARBON DISULFIDE: INCANDESCENT REACTION.

CARBON TETRACHLORIDE + METHANOL: EXTREMELY VIGOROUS REACTION.

CHLORATES: FORMS SHOCK-SENSITIVE MIXTURES.

CHLORINATED RUBBER: VIOLENT OR EXPLOSIVE REACTION AT ELEVATED TEMPERATURES.

CHROMIC ANHYDRIDE: VIOLENT REACTION AND POSSIBLE IGNITION.

COBALT HALIDE (METHANOLIC SOLUTION) + IRON PENTACARBONYL: VIOLENT REACTION.

ETHYL ACETOACETATE + TRIBROMONEOPENTYL ALCOHOL: MAY REACT EXPLOSIVELY.

HALOCARBONS: POSSIBLE VIOLENT REACTION WITH IGNITION.

HALOGENS: POSSIBLE IGNITION.

HYDRAZINE NITRATE: IGNITES ON WARMING.

HYDROXYLAMINE: MAY IGNITE OR EXPLODE WHEN HEATED.

INTERHALOGENS: VIOLENT REACTION AND POSSIBLE IGNITION.

LEAD AZIDE: INCREASED SENSITIVITY TO EXPLOSIVE DECOMPOSITION.

MANGANESE DICHLORIDE: EXPLOSIVE REACTION WHEN HEATED.

METAL OXIDES: POSSIBLE IGNITION OR INCANDESCENT REACTION.

NITRIC ACID: INCANDESCENT REACTION.

2-NITROANISOLE + SODIUM HYDROXIDE: EXOTHERMIC REACTION.

NITROBENZENE: MAY FORM PYROPHORIC RESIDUE.

NITRYL FLUORIDE: INCANDESCES WHEN WARMED.

OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

PEROXYFORMIC ACID: VIOLENT EXPLOSION ON CONTACT.

POTASSIUM NITRATE: EXPLOSIVE REACTION ON HEATING.

POTASSIUM PEROXIDE: INCANDESCENT REACTION.

RHODIUM HALIDES (METHANOLIC SOLUTION) + IRON PENTACARBONYL: VIOLENT REACTION.

RUTHENIUM HALIDES (METHANOLIC SOLUTION) + IRON PENTACARBONYL: VIOLENT REACTION.

SELENIUM: INCANDESCENT REACTION.

SELENINYL BROMIDE: IGNITION.

SILVER + ELECTROLYTES (BATTERIES): MAY SPONTANEOUSLY COMBUST.

SODIUM PEROXIDE: INCANDESCENT REACTION.

SULFUR: VIOLENT REACTION.

TELLURIUM: INCANDESCENT REACTION.

ZINC CHLORIDE: MAY INCREASE FLAMMABILITY.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC FUMES OF ZINC OXIDE.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

PROTECT AGAINST PHYSICAL DAMAGE. STORE IN COOL, DRY, VENTILATED PLACE. SEPARATE FROM ACIDS, HALOGENATED HYDROCARBONS AND STRONG ALKALI HYDROXIDES. PROTECT FROM MOISTURE. (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

PREVENT DISPERSION OF DUST IN AIR. MAY BE IGNITED BY HEAT, SPARKS, OR FLAMES. MAY BURN RAPIDLY WITH FLARE-BURNING EFFECT. MAY IGNITE IN THE PRESENCE OF MOISTURE.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

DO NOT TOUCH SPILLED MATERIAL. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN HAZARD AREA. FOR 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. DIKE SPILL FOR LATER DISPOSAL. CLEAN UP ONLY UNDER SUPERVISION OF AN EXPERT.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:

PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

FOR ZINC OXIDE FUME:

50 MG/M3- ANY DUST, MIST AND FUME RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

125 MG/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST, MIST AND FUME FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

250 MG/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

2500 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A HALF-MASK AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 03/26/86 REVISION DATE: 02/25/92

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OHS25665

MATERIAL SAFETY DATA SHEET

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR
1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS NUMBER: 7440-67-7
RTECS NUMBER: ZH7070000

SUBSTANCE: ZIRCONIUM SCRAP

TRADE NAMES/SYNONYMS:

ZIRCONIUM METAL SCRAP; ZIRCONIUM BORINGS; ZIRCONIUM CLIPPINGS;
ZIRCONIUM SHAVINGS; ZIRCONIUM SHEETS; ZIRCONIUM TURNINGS; UN 1932;
STCC 4916212; ZR; OHS25665

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: ZR

MOLECULAR WEIGHT: 91.22

CERCLA RATINGS (SCALE 0-3): HEALTH=1 FIRE=3 REACTIVITY=1 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=4 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: ZIRCONIUM SCRAP
CAS# 7440-67-7

PERCENT: 100

EXPOSURE LIMITS:

ZIRCONIUM COMPOUNDS (AS ZR):

5 MG/M3 OSHA TWA; 10 MG/M3 OSHA STEL
5 MG/M3 ACGIH TWA; 10 MG/M3 ACGIH STEL
5 MG/M3 NIOSH RECOMMENDED TWA; 10 MG/M3 NIOSH RECOMMENDED STEL
5 MG/M3 DFG MAK TWA (TOTAL DUST);
50 MG/M3 DFG MAK 30 MINUTE PEAK, AVERAGE VALUE, 1 TIME/SHIFT

MEASUREMENT METHOD: PARTICULATE FILTER; ACID; INDUCTIVELY COUPLED PLASMA;
(NIOSH VOL. III # 7300, ELEMENTS).

PHYSICAL DATA

DESCRIPTION: LUSTROUS, GRAYISH METALLIC SOLID.

BOILING POINT: 7911 F (1852 C) MELTING POINT: 3366 F (4377 C)

SOLUBILITY IN WATER: INSOLUBLE

SOLVENT SOLUBILITY: SOLUBLE IN HYDROGEN FLUORIDE, AQUA REGIA; SLIGHTLY SOLUBLE IN SOME ACIDS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

NEGLIGIBLE FIRE HAZARD IN BULK FORM; HOWEVER, DUST, POWDER, OR FUMES ARE FLAMMABLE OR EXPLOSIVE WHEN EXPOSED TO HEAT OR FLAMES.

MAY BE IGNITED BY STATIC ELECTRICITY.

FINELY DIVIDED MATERIAL MAY IGNITE ON EXPOSURE TO AIR.

MATERIAL CAN BURN UNDER WATER AND DOES SO WITH GREATER INTENSITY THAN IT BURNS IN AIR.

FIREFIGHTING MEDIA:

USE DRY SAND, DOLOMITE, GRAPHITE, SODIUM CHLORIDE, SODA ASH, OR APPROPRIATE METAL-EXTINGUISHING POWDER. DO NOT APPLY WATER TO BURNING MATERIAL (NFPA FIRE PROTECTION HANDBOOK, 16TH EDITION).

FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 32).

EXTINGUISH USING AGENT FOR TYPE OF FIRE. AVOID BREATHING FUMES FROM BURNING MATERIAL.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND SUBPART E:
FLAMMABLE SOLID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.220
EXCEPTIONS: 49 CFR 173.153

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180), DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204. EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS

AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO OCTOBER 1, 1993. (56 FR 47158, 10/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
ZIRCONIUM SCRAP-UN 1932

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
4.2 - SPONTANEOUSLY COMBUSTIBLE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
SPONTANEOUSLY COMBUSTIBLE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.213
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: FORBIDDEN

TOXICITY

ZIRCONIUM:
CARCINOGEN STATUS: NONE.
ACUTE TOXICITY LEVEL: NO DATA AVAILABLE.
TARGET EFFECTS: POISONING MAY AFFECT THE LUNGS.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN DISORDERS.*
ADDITIONAL DATA: MAY CROSS THE PLACENTA AND BE EXCRETED IN BREAST MILK.*

* MAY BE BASED ON GENERAL ZIRCONIUM COMPOUND INFORMATION.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ZIRCONIUM:
500 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- NO DATA AVAILABLE.
CHRONIC EXPOSURE- PULMONARY GRANULOMAS HAVE BEEN OBSERVED IN ZIRCONIUM WORKERS. EXPOSURE OF ANIMALS TO ZIRCONIUM COMPOUND DUSTS CAUSED INTERSTITIAL PNEUMONITIS, PERIBRONCHIAL ABSCESSSES, PERIBRONCHIAL GRANULOMA, AND LOBULAR PNEUMONIA. FIBROUS LUNG CHANGES AND LIVER NECROSIS WAS OBSERVED IN ANIMALS DOSED INTRATRACHEALLY WITH VARIOUS ZIRCONIUM COMPOUNDS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ZIRCONIUM:

ACUTE EXPOSURE- SOME ZIRCONIUM COMPOUNDS MAY CAUSE SENSITIZATION REACTIONS IN PREVIOUSLY EXPOSED PERSONS.

CHRONIC EXPOSURE- REPEATED CONTACT WITH SOME ZIRCONIUM COMPOUNDS HAVE PRODUCED HYPERSENSITIVITY GRANULOMAS CHARACTERIZED BY DUSKY RED-BROWN PAPULES. THE GRANULOMAS PRODUCED BY INSOLUBLE ZIRCONIUM SALTS MAY PERSIST FOR YEARS AND ARE RESISTANT TO TREATMENT WHERE AS THOSE PRODUCED BY SOLUBLE SALTS USUALLY DISAPPEAR WITHIN A FEW MONTHS.

FIRST AID- 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.

EYE CONTACT:

ZIRCONIUM:

ACUTE EXPOSURE- NO DATA AVAILABLE.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- WASH 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.

INGESTION:

ZIRCONIUM:

ACUTE EXPOSURE- ZIRCONIUM AND ITS SALTS GENERALLY HAVE LOW SYSTEMIC TOXICITY. ACUTELY POISONED ANIMALS SHOWED PROGRESSIVE DEPRESSION AND DECREASED ACTIVITY UNTIL DEATH. PATHOLOGIC OBSERVATIONS INCLUDED KIDNEY AND LIVER LESIONS.

CHRONIC EXPOSURE- SUBACUTE DOSES OF ZIRCONIUM COMPOUNDS PRODUCED WEIGHT LOSS, WEAKNESS, DIARRHEA, LIVER DAMAGE, AND DEATH IN ANIMALS.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:

ZIRCONIUM:

MAY IGNITE FROM FRICTION OR STATIC DISCHARGE. SOME FORMS MAY BE SPONTANEOUSLY COMBUSTIBLE IN AIR. THE PRESENCE OF SMALL AMOUNTS OF WATER MAY INCREASE SUSCEPTIBILITY OF IGNITION. MATERIAL CAN BURN UNDER WATER AND DOES SO

WITH GREATER INTENSITY THAN IT BURNS IN AIR.

INCOMPATIBILITIES:

ZIRCONIUM:

ACID SOLUTIONS: VIOLENT REACTION.
ALKALI HYDROXIDES: EXPLOSION ON HEATING.
ALKALI METAL CARBONATES: EXPLOSIVE REACTION.
ALKALI METAL SALTS (CHROMATES, DICHROMATES, MOLYBDATES, SULFATES, TUNGSTATES): VIOLENT OR EXPLOSIVE REACTION.
AQUA REGIA: REACTS.
BORAX: EXPLOSION ON HEATING.
CARBON DIOXIDE: FIRE AND EXPLOSION HAZARD.
CARBON DIOXIDE AND NITROGEN: IGNITES ON HEATING.
CARBON TETRACHLORIDE: EXPLOSION.
CUPRIC OXIDE: EXPLOSION.
FLAMMABLE GASES: VIOLENT OR EXPLOSIVE REACTION.
FLAMMABLE LIQUIDS: VIOLENT OR EXPLOSIVE REACTION.
HYDROGEN FLUORIDE: REACTS.
LEAD: 10-70% ZIRCONIUM ALLOY IGNITES ON IMPACT WITH HAMMER.
LEAD OXIDE: EXPLOSION.
NITROGEN: FIRE AND EXPLOSION HAZARD.
NITRYL FLUORIDE: INCANDESCENT REACTION.
MAGNESIUM CHLORIDE: FIRE AND EXPLOSION HAZARD.
ORGANIC PEROXIDES: VIOLENT OR EXPLOSIVE REACTION.
OXIDIZERS: VIOLENT OR EXPLOSIVE REACTION.
PHOSPHORIC ACID (HOT): REACTS.
PHOSPHORUS: INCANDESCENT REACTION WHEN HEATED IN A VACUUM.
POTASSIUM BISULFATE: FIRE AND EXPLOSION HAZARD.
POTASSIUM CHLORATE: EXPLOSION ON HEATING AND IGNITION ON IMPACTS.
POTASSIUM HYDROXIDE: ATTACKS METALS.
POTASSIUM NITRATE: EXPLOSION ON HEATING.
SODIUM TETRABORATE (HYDRATED): EXPLOSIVE REACTION.
SULFURIC ACID (HOT, CONCENTRATED): ATTACKS.
ZIRCONIUM HYDROXIDE: EXPLOSION REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

****STORAGE****

CONSULT NFPA PUBLICATION 482, PRODUCTION, PROCESSING, HANDLING, AND STORAGE OF ZIRCONIUM.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES OR OTHER SOURCES OF IGNITION. MATERIAL IS EXTREMELY FLAMMABLE AND MAY BURN RAPIDLY WITH FLARE-BURNING EFFECT.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. FOR SMALL SPILLS, WITH CLEAN SHOVEL, PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, WET DOWN WITH WATER AND DIKE FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATOR:
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; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ZIRCONIUM COMPOUNDS AS ZR:

25 MG/M3- ANY DUST AND MIST RESPIRATOR.

50 MG/M3- ANY DUST AND MIST RESPIRATOR EXCEPT SINGLE-USE AND QUARTER-MASK RESPIRATORS.
ANY SUPPLIED-AIR RESPIRATOR.
ANY SELF-CONTAINED BREATHING APPARATUS.

125 MG/M3- ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW MODE.

250 MG/M3- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED, AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR THAT HAS A TIGHT-FITTING FACEPIECE AND IS OPERATED IN A CONTINUOUS-FLOW MODE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

500 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING, FULL-FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE, SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

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.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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CREATION DATE: 01/13/85 REVISION DATE: 02/25/92

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