

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, New Zealand, Japanese, and European Union Standards

1. PRODUCT IDENTIFICATION

TRADE/MATERIAL NAME: ENHANCERPRO PENETRATING AGENT
CHEMICAL NAMES: Aliphatic Glycol Ether
PRODUCT USE: Penetrating Agent
SYNONYMS: None
U.N. NUMBER: Not applicable
U.N. DANGEROUS GOODS CLASS/SUBSIDIARY RISK: Not applicable
HAZCHEM CODE (AUSTRALIA): Not applicable
POISONS SCHEDULE NUMBER (AUSTRALIA): Not applicable
SUPPLIER/MANUFACTURER'S NAME (USA/Canada): AMERICAN DECORATIVE CONCRETE SUPPLY COMPANY
ADDRESS: 515 South Thompson, Suite B
Springdale, AR 72764
EMERGENCY PHONE: 1-800-255-3924 (CHEM-TEL) in U.S., Canada, Puerto Rico,
U.S. Virgin Islands
01-813-248-0585 (outside areas above, call collect)
(847) 793-6945
BUSINESS PHONE:
SUPPLIER/IMPORTER'S NAME (Europe):
ADDRESS:
EMERGENCY PHONE:
BUSINESS PHONE:
SUPPLIER/IMPORTER'S NAME (Australia):
ADDRESS:
EMERGENCY PHONE:
BUSINESS PHONE:
SUPPLIER/IMPORTER'S NAME (New Zealand):
ADDRESS:
EMERGENCY PHONE:
BUSINESS PHONE:

2. COMPOSITION and INFORMATION ON INGREDIENTS

EU LABELING/CLASSIFICATION: This product meets the definitions of Harmful and Irritant as defined by the European Union Council Directive 67/548/EEC or subsequent Directives.

EU CLASSIFICATION: Xn: [Harmful]; Xi [Irritant]

EU RISK PHRASES: R: 20/21/22; R: 36/38

CHEMICAL NAME	CAS #	EINECS #	AICS Inventory Listing	% w/v	EU CLASSIFICATION FOR COMPONENTS
Proprietary Aliphatic Glycol Ether			Listed	100	Hazard Classification: Xn: [Harmful]; Xi [Irritant] Risk Phrases: R: 20/21/22; R: 36/38

NOTE: ALL Canadian WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. All European Union, Australian (NOHSC:2011, 8.30-8.48) information, and Japanese Industrial Standard (JIS Z 7250: 2000) required information is included.

See Section 16 for full text of Ingredient Risk Phrases

3. HAZARD IDENTIFICATION

EU LABELING/CLASSIFICATION: This product meets the definitions of Harmful and Irritant as defined by the European Union Council Directive 67/548/EEC or subsequent Directives.

EU CLASSIFICATION: Xn: [Harmful]; Xi [Irritant]

EU RISK PHRASES: R: 20/21/22; R: 36/38

EMERGENCY OVERVIEW: Product Description: This product is a clear, colorless liquid with a mild, slightly rancid odor. **Health Hazards:** Harmful if swallowed. Inhalation and skin absorption can be harmful and can cause headache, nausea, dizziness, vomiting, drowsiness, incoordination, and confusion. Causes severe eye and skin irritation.

3. HAZARD IDENTIFICATION (Continued)

EMERGENCY OVERVIEW (continued): Flammability Hazards: This product is combustible. Vapors from this product are heavier than air and may travel to a source of ignition and flashback to a leak or open container. If involved in a fire, this product will release smoke, acrid vapors and toxic gases (e.g., carbon oxides and peroxides). **Reactivity Hazards:** This product is not reactive. **Environmental Hazards:** Large quantities released to the environment may have an adverse effect. **Emergency Considerations:** Emergency responders should wear appropriate protection for situation to which they respond.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

The health hazard information provided below is pertinent to employees using this product in an occupational setting. The following paragraphs describe the symptoms of exposure by route of exposure.

INHALATION: Inhalation overexposures to vapors, mists, and sprays of this product can cause nasal irritation, a disagreeable metallic taste, a slight increase in nasal discharge, headache, nausea, dizziness, drowsiness, and confusion. Inhalation overexposures to very high vapor levels of this product, as may occur in a poorly ventilated and confined space, may cause significant may cause loss of consciousness and death.

CONTACT WITH SKIN or EYES: Vapors of this product can irritate the eyes. Direct eye contact will cause immediate pain, irritation, redness and tearing. Skin contact may be irritating. Prolonged or repeated skin overexposures can cause dermatitis (dry red skin).

SKIN ABSORPTION: This product can be absorbed through intact skin. Skin absorption can cause symptoms such as those described under "Inhalation".

INGESTION: Ingestion is not a significant route of occupational overexposure and is unlikely to occur. If this product is swallowed, it may irritate the mouth, throat, esophagus and other tissues of the digestive system. Symptoms of ingestion include nausea, vomiting, and diarrhea. Ingestion also causes symptoms such as those described under "Inhalation". Ingestion may harm the kidneys.

INJECTION: Accidental injection of this product, via laceration or puncture by a contaminated object may cause redness at the site of injection.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Overexposure to this product may cause the following health effects:

ACUTE: Overexposures to this product can irritate eyes, and mucous membranes. Inhalation, skin absorption, and ingestion overexposure can cause symptoms such as those described under "Inhalation".

CHRONIC: Prolonged or repeated skin overexposures can cause dermatitis (dry red skin).

TARGET ORGANS: **ACUTE:** Skin, eyes, respiratory system, central nervous system. **CHRONIC:** Skin, respiratory system, central nervous system.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD	(BLUE)	3	
FLAMMABILITY HAZARD	(RED)	2	
PHYSICAL HAZARD	(YELLOW)	0	
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8
For Routine Industrial Use and Handling Applications			

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate
3 = Serious 4 = Severe * = Chronic hazard

4. FIRST-AID MEASURES

If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Take a copy of label and MSDS to physician or health professional with the contaminated individual.

SKIN EXPOSURE: If adverse skin effects occur, discontinue use and flush contaminated area. Seek medical attention if adverse effect occurs after flushing.

EYE EXPOSURE: If this product contaminates the eyes, rinse eyes under gently running water. Use sufficient force to open eyelids and then "roll" eyes while flushing. Minimum flushing is for 15 minutes. The contaminated individual must seek medical attention if any adverse effect continues after rinsing.

INHALATION: If vapors of this product are inhaled, causing irritation, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect continues after removal to fresh air.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, DO NOT INDUCE VOMITING. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain immediate medical attention.

4. FIRST-AID MEASURES (Continued)

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, respiratory system, and central nervous system disorders may be aggravated by overexposures to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: 62°C (143°F)

AUTOIGNITION TEMPERATURE: 238°C (460°F)

FLAMMABLE LIMITS (in air by volume, %):

LOWER (LEL): 1.1%

UPPER (UEL): 12.7%

FIRE EXTINGUISHING MATERIALS: This product is combustible. The following extinguishing materials are recommended for fires involving this product.

WATER SPRAY: OK

CARBON DIOXIDE: OK

FOAM: OK

DRY CHEMICAL: OK

HALON: NO

OTHER: NO

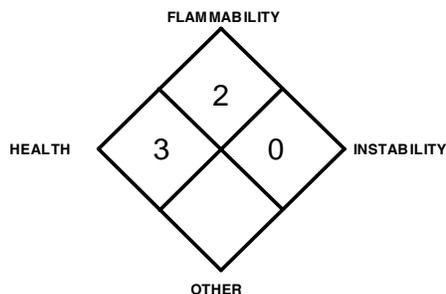
UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is a Class IIIA combustible liquid. When involved in a fire, this material may ignite and produce irritating vapors and toxic gases (e.g., carbon oxides and peroxides). Vapors from the product may travel to a source of ignition, and flashback to a leak or open container.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: Not sensitive.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus (SCBA) and full protective equipment. Chemical resistant clothing may be necessary. Move containers from fire area if it can be done without risk to personnel. Water spray can be used to cool fire-exposed containers. Water fog or spray can also be used by trained firefighters to disperse this product's vapors and to protect personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING



Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate
3 = Serious 4 = Severe

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel. Eliminate all sources of ignition before cleanup begins. Use non-sparking tools. Minimum Personal Protective Equipment should be double-gloves (rubber over latex gloves) and rubber apron, splash goggles or safety glasses. Monitor area for combustible vapor levels to determine level of combustible vapors before personnel are allowed into the spill area. Colorimetric detector tubes are available. The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Limits and Personal Protection) and at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus (SCBA). Absorb spilled liquid with non-combustible absorbent materials. Decontaminate the area thoroughly. Place all spill residue in a double plastic bag and seal. Dispose of in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of the EU and its member states, Australia, New Zealand, Japan, or Canada and its Provinces.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this material ON YOU or IN YOU. Do not eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product or containers of this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Follow SPECIFIC USE INSTRUCTIONS supplied with product.

STORAGE AND HANDLING PRACTICES: Employees must be trained to properly use this product. Keep away from heat, sparks, and other sources of ignition. Use non-sparking tools. Open containers slowly on a stable surface. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Storage areas should be made of fire resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers). Keep container tightly closed when not in use. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Empty containers may contain residual liquid or vapors that are combustible; therefore, empty packages should be handled with care. Refer to NFPA 30, *Flammable and Combustible Liquids Code*, for additional information on storage.

7. HANDLING and USE (Continued)

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely, if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, and local procedures or with procedures of the EU and its member states, Australia, New Zealand, Japan, or Canada and its Provinces.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Exhaust directly to the outside, taking necessary precautions for environmental protection. If necessary, refer to Australian National Code of Practice for the Control of Workplace Hazardous Substances [NOHSC: 2007 (1994)] for further information.

EXPOSURE LIMITS/GUIDELINES:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLV		OSHA-PEL		NIOSH-RELS		NIOSH	OTHER
		TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	IDLH mg/m ³	mg/m ³
Proprietary Aliphatic Glycol Ether		97	NE	240 (skin) 120 (skin) [vacated 1989 PEL]	NE	24 (skin)	NE	3381	DFG MAKs: TWA = 98 (skin) PEAK = 4•MAK 15 min., average value, 1 hour interval Pregnancy Risk Group Classification: C Carcinogen: EPA-C, EPA-CBD, IARC-3, TLV-A3

NE = Not Established. See Section 16 for Definitions of Terms Used.

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: Currently, the following international exposure limits are established for this product. Individual country exposure limits may change and should be checked.

<p>Australia: TWA = 25 ppm (120 mg/m³), Skin, JAN 1993 Austria: MAK = 20 ppm (100 mg/m³), Skin, JAN 1999 Belgium: TWA = 25 ppm (121 mg/m³), Skin, JAN 1993 Denmark: TWA = 25 ppm (120 mg/m³), Skin, JAN 1999 Finland: TWA = 25 ppm (120 mg/m³), STEL = 75 ppm (350 mg/m³), Skin, JAN 1999 France: VME = 25 ppm (120 mg/m³), Skin, JAN 1999 Germany: MAK = 20 ppm (100 mg/m³), Skin, JAN 1999 Hungary: TWA = 100 mg/m³, STEL = 200 mg/m³, Skin, JAN 1993 The Netherlands: MAC-TGG = 100 mg/m³, Skin, 2003 Norway: TWA = 20 ppm (100 mg/m³), JAN 1999</p>	<p>The Philippines: TWA = 50 ppm (240 mg/m³), Skin, JAN 1993 Poland: MAC(TWA) = 100 mg/m³, MAC(STEL) = 360 mg/m³, JAN 1999 Russia: STEL = 5 mg/m³, JAN 1993 Sweden: NGV = 10 ppm (50 mg/m³), KTV = 20 ppm (100 mg/m³), Skin, JAN 1999 Switzerland: MAK-W = 20 ppm (100 mg/m³), KZG-W = 40 ppm (200 mg/m³), Skin, JAN 1999 Turkey: TWA = 50 ppm (240 mg/m³), JAN 1993 United Kingdom: TWA = 25 ppm (123 mg/m³), Skin, SEP 2000 In Argentina, Bulgaria, Colombia, Jordan, Korea, New Zealand, Singapore, Vietnam, New Zealand, Singapore, Vietnam check ACGIH TLV</p>
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The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-02), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand protection, and CR 13464:1999 for face/eye protection), or standards of Australia (including AS/NZS 1715:1994 for respiratory PPE, AS/NZS 4501.2:2006 for protective clothing, AS/NZS 2161.1:2000 for glove selection, and AS/NZS 1336:1997 for eye protection). Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-02, the European Standard EN 529:2005, and EU member state standards, the Australian Standard 1716-Respiratory Protective Devices and Australian Standard 1715-Selection, Use, and Maintenance of Respiratory Protective Devices, New Zealand standards, or Japanese standards. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). The specific NIOSH recommendations for this material in air are as follows:

CONCENTRATION	RESPIRATORY EQUIPMENT
Up to 50 ppm:	Chemical cartridge respirator with organic vapour cartridge(s) or Supplied Air Respirator (SAR).
Up to 125 ppm:	SAR operated in a continuous-flow mode or powered air-purifying respirator with organic vapour cartridge(s).
Up to 250 ppm:	Full-facepiece chemical cartridge respirator with organic vapour cartridge(s), gas mask with organic vapour canister, powered air-purifying respirator with tight-fitting facepiece and organic vapour cartridge(s), full-facepiece Self-Contained Breathing Apparatus (SCBA), or full-facepiece SAR.
Up to 700 ppm:	Positive pressure, full-facepiece SAR.
Emergency or Planned Entry Into Unknown Concentrations or IDLH Conditions:	Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.
Escape:	Gas mask with organic vapour canister; or escape-type SCBA.

EYE PROTECTION: Wear safety glasses with side shields (or goggles) and a face shield. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-02, or the European Standard CR 13464:1999, the Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment, New Zealand standards, or Japanese standards.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

HAND PROTECTION: Wear Butyl rubber, Viton™, Barrier (PE/PA/PE), or Tychem™ SL gloves. Check gloves for leaks. Wash hands before putting on gloves and after removing gloves. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, the Australian Standard 2161-Industrial Safety Gloves and Mittens and the European Standard CEN/TR 15419:2006, New Zealand standards, or Japanese standards.

BODY/SKIN PROTECTION: Use body protection appropriate for task (e.g., coveralls or apron). If necessary, refer to appropriate Standards of Canada, the European Standard CEN/TR 15419:2006, Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals, New Zealand standards, or Japanese standards. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-02, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

BOILING POINT: 171°C (340°F)

EVAPORATION RATE (*n*-BuAc = 1): 0.07–0.08

VAPOR PRESSURE @ 20°C (air = 1): 0.76 mm Hg

ODOR THRESHOLD: 9.3 mg/L

VAPOR DENSITY (air = 1): 4.075

COEFFICIENT WATER/OIL DISTRIBUTION: Log P_{oct} = 0.83

APPEARANCE, ODOR, AND COLOR: This product is a clear, colorless liquid with a mild, slightly rancid odor.

HOW TO DETECT THIS SUBSTANCE (warning properties in event of accidental release): The odor may be a characteristic to distinguish a release of this product. Colorimetric detector tubes are available.

FREEZING/MELTING POINT: -75°C (-103°F)

SOLUBILITY IN WATER: Soluble.

SPECIFIC GRAVITY (water = 1): 0.9

pH: Not applicable.

MOLECULAR WEIGHT: 118.18

10. STABILITY and REACTIVITY

STABILITY: This product is stable when properly stored at normal temperature and pressures (see Section 7, Handling and Storage). Prolonged exposure to light and air may cause the formation of peroxides. The peroxides are unlikely to be hazardous unless they are concentrated during distillation or allowed to evaporate to dryness.

DECOMPOSITION PRODUCTS: If exposed to extremely high temperatures, thermal decomposition may generate irritating fumes and toxic gases (e.g., carbon oxides and peroxides).

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is incompatible with strong oxidizers, perchloric acid, and bases.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure to or contact with extreme temperatures, heat, sparks, flames, sunlight, and incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicological data are available for this product.

TDLo (oral, woman) = 600 mg/kg

TDLo (oral, woman) = 7813 µL/kg; Behavioral: coma; Vascular: BP lowering not characterized in autonomic section; Nutritional and Gross Metabolic: metabolic acidosis

TCLo (inhalation, human) = 195 ppm/8 hours; Gastrointestinal tract

TCLo (inhalation, human) = 100 ppm; Nose, Eye, Central nervous system

LD₅₀ (oral, rat) = 470 mg/kg

LD₅₀ (oral, mouse) = 1230 mg/kg; Behavioral: altered sleep time (including change in righting reflex), somnolence (general depressed activity); Skin and Appendages: hair

LD₅₀ (oral, rabbit) = 300 mg/kg

LD₅₀ (oral, guinea pig) = 1200 mg/kg; Behavioral: general anesthetic; Gastrointestinal: other changes; Kidney, Urethra, Bladder: other changes

LC₅₀ (inhalation, rat) = 2900 mg/m³

LC₅₀ (inhalation, rat) = 450 ppm/4 hours; Behavioral: ataxia; Nutritional and Gross Metabolic: weight loss or decreased weight gain

LC₅₀ (inhalation, mouse) = 700 ppm/7 hours

LD₅₀ (intraperitoneal, rat) = 220 mg/kg

LD₅₀ (intraperitoneal, mouse) = 536 mg/kg

LD₅₀ (intravenous, rat) = 340 mg/kg

LD₅₀ (intravenous, rat) = 307 mg/kg

LD₅₀ (intravenous, mouse) = 1130 mg/kg

LD₅₀ (intravenous, rabbit) = 252 mg/kg; Details of toxic effects not reported other than lethal dose value

LDLo (subcutaneous, mouse) = 500 mg/kg

LD₅₀ (skin, rabbit) = 220 mg/kg

LD₅₀ (skin, guinea pig) = 230 µg/kg

LD₅₀ (unreported, mouse) = 1050 mg/kg; Behavioral: somnolence (general depressed activity), excitement; Lungs, Thorax, or Respiration: other changes

TDLo (oral, rat) = 139 gm/kg/90 days/continuous; Liver: changes in liver weight; Kidney, Urethra, Bladder: changes in bladder weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (oral, rat) = 9324 mg/m³/21 days/continuous; Behavioral: fluid intake; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (oral, rat) = 1500 mg/kg/12 days/intermittent; Blood: pigmented or nucleated red blood cells, changes in erythrocyte (RBC) count

TDLo (oral, rat) = 13290 mg/kg/6 weeks/intermittent; Liver: changes in liver weight; Blood: changes in erythrocyte (RBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels phosphatases

TDLo (oral, rat) = 6279 mg/kg/male 13 weeks pre-mating; Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count)

TCLo (oral, rat) = 9440 mg/kg/female 7–14 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TDLo (oral, mouse) = 5180 mg/kg/2 weeks/continuous; Endocrine: changes in thymus weight

TDLo (oral, mouse) = 7 gm/kg/female 8–14 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TDLo (oral, mouse) = 9440 mg/kg/female 6–13 days after conception; Reproductive: Fertility: litter size (e.g. # fetuses per litter; measured before birth)

TCLo (inhalation, rat) = 200 ppm/6 hours/female 6–15 days after conception; Reproductive: Maternal Effects: uterus, cervix, vagina; post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants); litter size (e.g. # fetuses per litter; measured before birth)

TCLo (inhalation, rat) = 25 ppm/6 hours/female 6–15 days after conception; Reproductive: Specific Developmental Abnormalities: musculoskeletal system

TCLo (inhalation, rat) = 12 mg/kg/4 hours/female 1–19 days after conception; Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)

TCLo (inhalation, rat) = 10 mg/m³/24 hours/13 weeks/intermittent; Endocrine: hypoglycemia; Blood: changes in erythrocyte (RBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels transaminases

TCLo (inhalation, rat) = 1540 mg/m³/7 hours/5 weeks/intermittent; Blood: changes in erythrocyte (RBC) count

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

TCLo (inhalation, rat) = 432 ppm/7 hours/30 days/intermittent; Kidney, Urethra, Bladder: hematuria; Blood: other changes; Related to Chronic Data: death

TCLo (inhalation, rat) = 245 ppm/6 hours/9 days/intermittent; Liver: changes in liver weight; Blood: pigmented or nucleated red blood cells; Blood: changes in erythrocyte (RBC) count

TCLo (inhalation, mouse) = 396 ppm/7 hours/30 days/intermittent; Liver: changes in liver weight; Kidney, Urethra, Bladder: hematuria; Blood: other changes

TCLo (inhalation, mouse) = 401 ppm/7 hours/90 days/intermittent; Liver: changes in liver weight; Kidney, Urethra, Bladder: hematuria; Blood: other changes

TCLo (inhalation, dog) = 415 ppm/7 hours/12 weeks/intermittent; Blood: microcytosis with or without anemia; Kidney, Urethra, Bladder: other changes in urine composition

TCLo (inhalation, dog) = 385 ppm/7 hours/28 days/intermittent; Blood: other changes erythrocyte (RBC) count; Related to Chronic Data: death

TCLo (inhalation, rabbit) = 200 ppm/6 hours/female 6-18 days after conception; Reproductive: Maternal Effects: uterus, cervix, vagina; pre-implantation mortality (e.g. reduction in number of implants per female; total number of implants per corpora lutea)

TCLo (inhalation, rabbit) = 100 ppm/6 hours/female 6-18 days after conception; Reproductive: Specific Developmental Abnormalities: cardiovascular (circulatory) system

TCLo (inhalation, guinea pig) = 376 ppm/7 hours/30 days/intermittent; Lungs, Thorax, or Respiration: chronic pulmonary edema; Kidney, Urethra, Bladder: changes in bladder weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (skin, rabbit) = 4500 µL/kg/9 days/intermittent; Liver: changes in liver weight; Blood: pigmented or nucleated red blood cells; changes in erythrocyte (RBC) count

Skin Irritancy (rabbit) = 500 mg/open; mild
Eye Irritancy (rabbit) = 100 mg; severe
Eye Irritancy (rabbit) = 100 mg/24 hours; moderate
Mutation in Microorganisms (bacteria, *Salmonella typhimurium*) = 19 µmol/plate

IRRITANCY OF PRODUCT: The liquid or vapors of this product are irritating to contaminated tissue.

SENSITIZATION OF PRODUCT: This product is not known to be a human skin or respiratory sensitizer.

SUSPECTED CANCER AGENT: This product is listed by agencies tracking the carcinogenic potential of chemical compounds as follows:

PROPRIETARY ALIPHATIC GLYCOL ETHER: EPA-C (Possible Human Carcinogen); EPA-CBD (Cannot Be Determined); IARC-3 (Not Classifiable as to Carcinogenicity to Humans); ACGIH TLV-A3 (Confirmed Animal Carcinogen)

This product is not found on the following lists: U.S. FEDERAL OSHA Z LIST, NTP, and CAL/OSHA and therefore are neither considered to be nor suspected to be cancer-causing agents by these agencies.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects this product and its components on human and animal reproductive systems.

MUTAGENICITY: This material is not reported to cause human mutagenic effects.

EMBRYOTOXICITY: This material is not reported to cause human embryotoxic effects.

TERATOGENICITY: This material is not reported to cause teratogenic effects in humans. The teratogenicity of this material was evaluated in both rats and rabbits exposed 6 hours/day at 0, 25, 50, 100, or 200 ppm on gestational days 6 to 15 for rats and 6 to 18 for rabbits. No developmental toxicity, including malformations, was observed at non-maternally toxic exposures, this compound induced slight embryo/feto-toxicity in rats (decreased embryo/pup viability and delayed skeletal ossification) and embryo toxicity in rabbits (decreased viable embryo/fetuses).

REPRODUCTIVE TOXICITY: This material is not reported to cause human reproductive effects. This material has caused testicular changes in rats after a single exposure to 600 ppm or more for 4 hours. This compound caused a reduction in testicular weight following a single exposure to saturated vapor of 17 mg/L for 3 hours; at 4 mg/L showed no effect on the testis.

*A **mutagen** is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An **embryo toxin** is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance that interferes in any way with the reproductive process.*

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, there are ACGIH Biological Exposure Indices (BEIs) determined for the 2-Butoxyethanol component of this product.

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
Proprietary Aliphatic Glycol Ether • Butoxyacetic Acid (BAA) in Urine	• End of shift	• 200 mg/g creatinine

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product will be relatively stable under ambient environmental conditions. The following environmental data are available for this product:

Terrestrial Fate: Based on a classification scheme, an estimated Koc value of 67, determined from a log Kow of 0.83, indicates that this material is expected to have very high mobility in soil. Volatilization of this material from moist soil surfaces is expected to be an important fate process given an Henry's Law constant of 1.60X10⁻⁶ atm-cu m/mole. This compound is expected to volatilize slowly from dry soil surfaces based upon a vapor pressure of 0.88 mmHg. This compound reached 91% of its theoretical BOD in 14 days using an activated sludge inoculum. Therefore this compound is expected to biodegrade rapidly in the soil environment.

Aquatic Fate: Based on a classification scheme, an estimated Koc value of 67, determined from a log Kow of 0.83, indicates that this compound is not expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is expected based upon a Henry's Law constant of 1.6X10⁻⁶ atm-cu m/mole. Using this Henry's Law constant and an estimation method, volatilization half-lives for a model river and model lake are 25 and 185 days, respectively. According to a classification scheme, an estimated BCF of 3, from its log Kow of 0.83 and a regression-derived equation, suggests the potential for bioconcentration in aquatic organisms is low. Alcohols and ethers are generally resistant to hydrolysis. This compound reached 91% of its theoretical BOD in 14 days using an activated sludge inoculum. Therefore this compound is expected to biodegrade rapidly in the aquatic environment.

12. ECOLOGICAL INFORMATION (Continued)

ENVIRONMENTAL STABILITY (continued):

Atmospheric Fate: According to a model of gas/particle partitioning of semi-volatile organic compounds in the atmosphere, this compound, which has a vapor pressure of 0.88 mm Hg at 25°C is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase material is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 16 hours, calculated from its rate constant of 1.86X10⁻¹¹ cu cm/molecule-sec at 25°C.

Bioconcentration: An estimated BCF of 3 was calculated for this compound, using an estimated log Kow of 0.83 and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is low.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No specific information is currently available on the effect of this product on plants or animals in the environment. This product may be harmful to contaminated plant and animal life, especially if released to the environment in large quantities.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No information is currently available on the effect of this product on aquatic plants or animals in the environment. Release of this product to an aquatic environment may be harmful to aquatic plant and animal life in contaminated bodies of water, especially in large quantities. The following aquatic toxicity data are available for this product:

LC₅₀ (*Menidia beryllina* Inland silverside) 96 hours = 1250 mg/L; static
LC₅₀ (*Crangon crangon* brown shrimp) 48 hours = 800 mg/L/ (range: 600-1000 mg/L)/Conditions of bioassay not specified in source examined
LC₅₀ (*Crangon crangon* brown shrimp) 96 hours = 775 mg/L (range: 550-950 mg/L)/Conditions of bioassay not specified in source examined
LC₅₀ (*Poecilia reticulata* Guppy) 7 days = 983 mg/L /Conditions of bioassay not specified in source examined
LC₅₀ (*Daphnia magna* Waterflea) 24 hours = 1,720 mg/L; static
LC₅₀ (*Lepomis macrochirus* Bluegill) 96 hours = 1,490 mg/L; static
LC₅₀ (*Carassius auratus* Goldfish) 24 hours = 1,700 mg/L; static
LC₅₀ (*Leuciscus idus melanotus* Golden ide) 48 hours = 186 mg/L/Conditions of bioassay not specified in source examined

LC₅₀ (*Pimephales promelas* Fathead minnow) 96 hours = 2137 mg/L/Conditions of bioassay not specified in source examined
LC₅₀ (*Notropis atherinoides* Emerald shiner) 72 hours = > 500 mg/L/Conditions of bioassay not specified in source examined
LC₅₀ (*Oncorhynchus mykiss* Rainbow trout) 96 hours = > 1000 mg/L /Conditions of bioassay not specified in source examined
LC₅₀ (*Crassostrea virginica* Oyster) 96 hours = 89 mg/L/Conditions of bioassay not specified in source examined
LC₅₀ (*Cyprinodon variegatus* Sheepshead minnow) 96 hours = 116 mg/L/Conditions of bioassay not specified in source examined
LC₅₀ (*Artemia salina* Brine shrimp) 24 hours = 1000 mg/L/Conditions of bioassay not specified in source examined

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada and its Provinces, Australia, New Zealand, Japan, the EU, or EU member States. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

U.S. EPA WASTE NUMBER: Not applicable.

14. TRANSPORTATION INFORMATION

THIS PRODUCT IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME:	Combustible liquid
HAZARD CLASS NUMBER and DESCRIPTION:	Combustible liquid
UN IDENTIFICATION NUMBER:	NA 1993
PACKING GROUP:	III
DOT LABEL(S) REQUIRED:	None
EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004):	128
MARINE POLLUTANT: This product is not classified by the U.S. DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).	

NOTE: Shipments of this product can qualify for specific exceptions, as follows:

Shipments under 30 mL (1 ounce): Such shipments qualify for the small quantity exception (per 49 CFR 173.4). These shipments must be properly marked and packaged, per 49 CFR 173.4.

Shipments of not more than 5 L (1.3 gallons): Such shipments qualify for limited quantity exception and may qualify to be shipped as a consumer commodity. These shipments must be properly marked and packaged, per 49 CFR 173.150.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This product is not classified as dangerous goods under rules of IATA.

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION: This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

AUSTRALIAN FEDERAL OFFICE OF ROAD SAFETY CODE FOR THE TRANSPORTATION OF DANGEROUS GOODS BY ROAD OR RAIL: This product is not classified as dangerous goods, per regulations of the Federal Office of Road Safety.

15. REGULATORY INFORMATION

UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Proprietary Aliphatic Glycol Ether (Glycol Ether Category)	No	No	Yes

U.S. SARA HAZARD CATEGORIES (SECTION 311/312, 40 CFR 370-21): ACUTE: Yes; CHRONIC: Yes; FIRE: Yes; REACTIVE: No; SUDDEN RELEASE: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: This compound is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: On November 18, 2004, the Environmental Protection Agency (EPA) removed the Aliphatic Glycol Ether component from the Clean Air Act (CAA) list of hazardous air pollutants (HAPs). This material is thus no longer subject to the Maximum Achievable Control Technology (MACT), residual risk and other specific requirements found in the CAA.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): This material is not on the California Proposition 65 lists.

ANSI LABELING (Z129.1): **WARNING!** COMBUSTIBLE LIQUID AND VAPOR. HARMFUL IF INHALED, ABSORBED THROUGH THE SKIN, OR SWALLOWED. CAUSES SKIN, EYE, AND RESPIRATORY TRACT IRRITATION. CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. Keep away from heat and flame. Avoid contact with skin, eyes, and clothing. Avoid breathing vapors, mists, or sprays. Do not taste or swallow. Avoid prolonged or repeated skin contact. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear appropriate eye, hand, and body protection. Avoid exposure to elevated temperatures. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation develops or persists. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, foam, dry chemical, or CO₂. **IN CASE OF SPILL:** Sweep up or vacuum spilled solid. Place residual in appropriate container and seal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations or those of Canada, EU Member States or Australia. Consult Material Safety Data Sheet for additional information.

CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: This compound is on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: This compound is not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS:

Class B3: Combustible liquid

Class D1A: Very Toxic Material Causing Immediate and Serious Toxic Effects

Class D2B: Toxic Material Causing Other Toxic Effects



EUROPEAN UNION INFORMATION:

EU LABELING/CLASSIFICATION: This product meets the definitions of Harmful and Irritant as defined by the European Union Council Directive 67/548/EEC or subsequent Directives.

EU CLASSIFICATION: Xn: [Harmful]; Xi [Irritant]

EU RISK PHRASES: [R: 20/21/22] Harmful by inhalation, in contact with skin, and if swallowed. [R: 36/38] Irritating to eyes and skin.

EU SAFETY PHRASES: [S: 2] Keep out of reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.*) [S: 7] Keep container tightly closed. [S: 16] Keep away from sources of ignition—No smoking. [S: 36/37] Wear suitable protective clothing and gloves. [S: 46] If swallowed, seek medical advice immediately and show this container or label. [S: 60] This material and its container must be disposed of as hazardous waste.

15. REGULATORY INFORMATION (Continued)

EUROPEAN UNION INFORMATION (continued):

EUROPEAN UNION ANNEX II HAZARD SYMBOL: Xn [Harmful]; Xi [Irritant]



AUSTRALIAN INFORMATION:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: This compound is listed on the AICS.

HAZARDOUS SUBSTANCES INFORMATION SYSTEM (HSIS): This compound is listed in the HSIS.

CLASSIFICATION: Xn: [Harmful]; Xi [Irritant]

RISK PHRASES: [R: 20/21/22] Harmful by inhalation, in contact with skin, and if swallowed. [R: 36/38] Irritating to eyes and skin.

SAFETY PHRASES: [S: 2] Keep out of reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.*) [S: 7] Keep container tightly closed. [S: 16] Keep away from sources of ignition—No smoking. [S: 36/37]

Wear suitable protective clothing and gloves. [S: 46] If swallowed, seek medical advice immediately and show this container or label. [S: 60]

This material and its container must be disposed of as hazardous waste.

POISONS SCHEDULE NUMBER: Schedule 6

ADDITIONAL LABELING: For advice, contact a Poisons Information Centre (61-2-9845-3111) or a doctor (at once). If in eyes, hold eyelids apart and flush the eye continuously with running water. Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.

NEW ZEALAND INFORMATION:

HAZARDOUS SUBSTANCES AND NEW ORGANISMS ACT (1996): This compound is registered as a hazardous substance with the Environmental Risk Management Authority. Specific controls apply to this product.

JAPANESE INFORMATION:

JAPANESE ENCS: This compound is on the ENCS Inventory.

JAPANESE MINISTRY OF ECONOMY, TRADE, AND INDUSTRY (MITI) STATUS: This compound is not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese METI.

POISONOUS AND DELETERIOUS SUBSTANCES CONTROL LAW: This compound is not a listed as a Specified Poisonous Substance under the Poisonous and Deleterious Substances Control Law.

16. OTHER INFORMATION

PREPARED BY:

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DEFINITION OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these, which are commonly used, include the following:

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

DFG MAK Germ Cell Mutagen Categories: **1:** Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed humans. **2:** Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed mammals. **3A:** Substances which have been shown to induce genetic damage in germ cells of human of animals, or which produce mutagenic effects in somatic cells of mammals *in vivo* and have been shown to reach the germ cells in an active form. **3B:** Substances which are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell *in vivo*; in exceptional cases, substances for which there are no *in vivo* data, but which are clearly mutagenic *in vitro* and structurally related to known *in vivo* mutagens. **4:** Not applicable (Category 4 carcinogenic substances are those with non-genotoxic mechanisms of action. By definition, germ cell mutagens are genotoxic. Therefore, a Category 4 for germ cell mutagens cannot apply. At some time in the future, it is conceivable that a Category 4 could be established for genotoxic substances with primary targets other than DNA [e.g. purely aneugenic substances] if research results make this seem sensible.) **5:** Germ cell mutagens, the potency of which is considered to be so low that, provided the MAK value is observed, their contribution to genetic risk for humans is expected not to be significant.

EXPOSURE LIMITS IN AIR (continued):

DFG MAK Pregnancy Risk Group Classification: **Group A:** A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. **Group B:** Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed. **Group C:** There is no reason to fear a risk of damage to the developing embryo or fetus when MAK and BAT values are observed. **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, they are not sufficient for final evaluation.

IDLH-Immediately Dangerous to Life and Health: This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

LOQ: Limit of Quantitation.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

DEFINITION OF TERMS (Continued)

EXPOSURE LIMITS IN AIR (continued):

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH's Recommended Exposure Limits.

PEL-Permissible Exposure Limit: OSHA's Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL that was vacated by Court Order.

SKIN: Used when there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HAZARD RATINGS: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:

0 (Minimal Hazard): No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation:* Essentially non-irritating. PII or Draize = "0". *Eye Irritation:* Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = "0". *Oral Toxicity LD₅₀ Rat.* < 5000 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC₅₀ Rat.* < 20 mg/L.; **1 (Slight Hazard):** Minor reversible injury may occur; slightly or mildly irritating. *Skin Irritation:* Slightly or mildly irritating. *Eye Irritation:* Slightly or mildly irritating. *Oral Toxicity LD₅₀ Rat.* > 500-5000 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit.* > 1000-2000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat* > 2-20 mg/L.; **2 (Moderate Hazard):** Temporary or transitory injury may occur. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation:* Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD₅₀ Rat.* > 50-500 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit.* > 200-1000 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat.* > 0.5-2 mg/L. **3 (Serious Hazard):** Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation:* Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation:* Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD₅₀ Rat.* > 1-50 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit.* > 20-200 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat.* > 0.05-0.5 mg/L.; **4 (Severe Hazard):** Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation:* Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation:* Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD₅₀ Rat.* ≤ 1 mg/kg. *Dermal Toxicity LD₅₀ Rat or Rabbit.* ≤ 20 mg/kg. *Inhalation Toxicity LC₅₀ 4-hrs Rat.* ≤ 0.05 mg/L).

FLAMMABILITY HAZARD:

0 (Minimal Hazard): Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.; **1 (Slight Hazard):** Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class III B, or; Most ordinary combustible materials [e.g. wood, paper, etc.]; **2 (Moderate Hazard):** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air, including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp); Solids and semisolids that readily give off flammable vapors.;

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued):

3 (Serious Hazard): Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]; **4 (Severe Hazard):** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric].

PHYSICAL HAZARD:

0 (Water Reactivity): Materials that do not react with water. *Organic Peroxides:* Materials that are normally stable, even under fire conditions and will not react with water. *Explosives:* Substances that are Non-Explosive. *Unstable Compressed Gases:* No Rating. *Pyrophorics:* No Rating. *Oxidizers:* No "0" rating allowed. *Unstable Reactives:* Substances that will not polymerize, decompose, condense or self-react.; **1 (Water Reactivity):** Materials that change or decompose upon exposure to moisture. *Organic Peroxides:* Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives:* Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases:* Pressure below OSHA definition. *Pyrophorics:* No Rating. *Oxidizers:* Packaging Group III; *Solids:* any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. *Liquids:* any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives:* Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.; **2 (Water Reactivity):** Materials that may react violently with water. *Organic Peroxides:* Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives:* Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases:* Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics:* No Rating. *Oxidizers:* Packing Group II *Solids:* any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. *Liquids:* any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Reactives:* Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3 (Water Reactivity):** Materials that may form explosive reactions with water. *Organic Peroxides:* Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives:* Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases:* Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics:* No Rating. *Oxidizers:* Packing Group I *Solids:* any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. *Liquids:* Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. *Unstable Reactives:* Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.);

DEFINITION OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

4 (Water Reactivity): Materials that react explosively with water without requiring heat or confinement. **Organic Peroxides:** Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. **Explosives:** Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. **Compressed Gases:** No Rating. **Pyrophorics:** Add to the definition of Flammability "4". **Oxidizers:** No "4" rating. **Unstable Reactives:** Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.).

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: 0 (materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 10,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 200 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 2000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 2000 mg/kg. Materials that are essentially non-irritating to the respiratory tract, eyes and skin. **1** (materials that, under emergency conditions, can cause significant irritation): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg. Materials that cause slight to moderate irritation to the respiratory tract, eyes and skin. **2** (materials that, under emergency conditions, can cause temporary incapacitation or residual injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause severe tissue damage, depending on duration of exposure. Materials that are respiratory irritants. Materials that cause severe, but reversible irritation to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers. **3** (materials that, under emergency conditions, can cause serious or permanent injury): Gases and vapors whose LC₅₀ for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD₅₀ for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD₅₀ for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. **4** (materials that, under emergency conditions, can be lethal): Gases and vapors whose LC₅₀ for acute inhalation toxicity less than or equal to 1,000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 1000 ppm.

FLAMMABILITY HAZARD: 0 Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand: Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur: Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 1 (continued) Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the *UN Recommendation on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. Most ordinary combustible materials. **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **4** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily: Flammable gases. Flammable cryogenic materials. Any liquid or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. **3** Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures.

DEFINITION OF TERMS (Continued)

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). **Flash Point** - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. **Autoignition Temperature**: The minimum temperature required to initiate combustion in air with no other source of ignition. **LEL** - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. **UEL** - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information**: The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information**: **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. **TL_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **ACGIH**: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDSL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA** or **Superfund**); and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration.

EUROPEAN: **EU** is the European Union (formerly known as the **EEC**, European Economic Community). **EINECS**: This the European Inventory of Now-Existing Chemical Substances. The **ARD** is the European Agreement Concerning the International Carriage of Dangerous Goods by Road and the **RID** are the International Regulations Concerning the Carriage of Dangerous Goods by Rail. **AUSTRALIAN**: **AICS** is the Australian Inventory of Chemical Substances. **NOHSC**: National Occupational Health & Safety Code.