SAFETY DATA SHEET

PECORA CORPORATION®
Architectural Weatherproofing Products
U.S.A. • since 1862

Klereseal® 910-W / 920-W

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

IDENTIFICATION of the SUBSTANCE or PREPARATION

TRADE NAME (AS LABELED):	**Klereseal® 910-W and 920-W**
PRODUCT DESCRIPTION:	Silicone
CHEMICAL NAME/CLASS:	Silane Mixture
SYNONYMS:	None
RELEVANT USE:	Water-Based Penetrating Masonry Sealer
USES ADVISED AGAINST:	Other Than Relevant Use

COMPANY/UNDERTAKING IDENTIFICATION:

SUPPLIER/MANUFACTURER'S NAME:	**Pecora Corporation**
ADDRESS:	165 Wambold Road, Harleysville, PA 19438
EMERGENCY PHONE:	800-424-9300 (CHEMTREC, 24-hours)
BUSINESS PHONE:	215-723-6051 (Mon–Fri, 8 AM–5 PM ET)
PREPARATION DATE:	January 2005
REVISION DATE:	September 23, 2014

This product is sold for commercial use. This SDS has been developed to address safety concerns of those individuals working with bulk quantities of this material, as well as those of potential users of this product in industrial/occupational settings. ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, and Canadian WHMIS [Controlled Products Regulations] and the Global Harmonization Standard required information is included in appropriate sections based on the U.S. ANSI Z400.1-2010 format. This product has been classified in accordance with the hazard criteria of the countries listed above.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION: This product has been classified per GHS Standards.

Classification: Flammable Liquid Cat. 3, Skin Irritation Cat. 2, Eye Irritation Cat. 2A, STOT (Inhalation-Respiratory Irritation, Central Nervous System) SE Cat. 3

Signal Word: Danger

Hazard Statement Codes: H226, H315, H319, H335, H336

Precautionary Statement Codes: P210, P240, P241, P243, P261, P264, P271, P280, P370 + P378,P303 + P361 + P358, P304 + P340, P312, P305 + P351 + P338, P302 + P352, P332 + P313, P362 + P364, P321, P403 + P233 + P235, P405, P501

Hazard Symbols/Pictograms: GHS02, GHS07

EMERGENCY OVERVIEW:

Physical Description: WARNING! Flammable liquid. This product is a clear, pale yellow, flammable liquid with an alcohol odor.

Health Hazards: This product may cause respiratory, skin and eye irritation. May be harmful if swallowed. Exposure may cause adverse central nervous system effects.

Flammability Hazard: This product is flammable and will ignite if exposed to its flash point [25°C (77°F)] or direct flame. Vapor can readily form explosive flammable concentrations in air. Vapors can travel to an ignition source and flash point.

Reactivity Hazard: Reaction with water may cause a decrease of the flash point due to formation of volatile organic compounds (VOC), including methanol and ethanol. As a result of hydrolysis flammable vapors may accumulate in the container head space of containers.

Environmental Hazard: This product has not been tested for environmental impact. All release to the environment should be avoided.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS®)

Health	**2**
Flammability	**3**
Physical Hazard	**1**

See Section 16 for definitions of ratings

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe
* = Chronic

HMIS® is a registered trademark of the National Paint and Coatings Association.

CANADIAN WHMIS CLASSIFICATION: D2B and Class B2. See Section 15 (Regulatory Information) for all classification details.

U.S. OSHA REGULATORY STATUS: This material is classified as hazardous under OSHA regulations.

3. COMPOSITION AND INFORMATION ON INGREDIENTS (Continued)

Chemical Name	CAS #	W/W%	GHS Classification Hazard Statements
Isooctyl Trimethylsilane	34396-03-7	30.0-60.0	SELF CLASSIFICATION Classification: Flammable Liquid Cat. 2, Skin Irritation Cat. 2, Eye Irritation Cat. 2B, STOT (Inhalation-Respiratory Irritation) SE Cat. 3 Hazard Statement Codes: H225, H315, H319, H335
Amino Functional Polydimethylsiloxane	67923-07-3	10.0-30.0	SELF CLASSIFICATION Classification: Skin Irritation Cat. 2, Eye Irritation Cat. 2B, STOT (Inhalation-Respiratory Irritation) SE Cat. 3 Hazard Statement Codes: H315, H319, H335

See Section 16 for full text of Ingredient Hazard and Precautionary Statements

3. COMPOSITION AND INFORMATION ON INGREDIENTS (Continued)

Chemical Name	CAS #	W/W%	GHS Classification Hazard Statements
Ethyl Silicate	78-10-4	10.0-30.0	Classification: Flammable Liquid Cat. 3, Acute Inhalation Toxicity Cat. 4, Eye Irritation Cat. 2A, STOT (Inhalation-Respiratory Irritation) SE Cat. 3 Hazard Codes: H226, H332, H319, H335
Acetic Acid	64-19-7	5.0-10.0%	Classification: Flammable Liquid Cat. 3, Skin Corrosion Cat. 1A Hazard Statement Codes: H226, H314
Ethanol	64-17-5	Trace	Classification: Flammable Liquid Cat. 2 Hazard Statement Codes: H225
Methanol	67-56-1	Trace	Classification: Flammable Liquid Cat. 2, Acute Oral Toxicity Cat. 3, Acute Dermal Toxicity Cat. 3, Acute Inhalation Toxicity Cat. 3, STOT (Ingestion-Eyes) SE Cat. 1 Hazard Statement Codes: H225, H301, H311, H331, H370

See Section 16 for full text of Ingredient Hazard and Precautionary Statements

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

PROTECTION OF FIRST AID RESPONDERS: Rescuers should not attempt to retrieve victims of exposure to this material without adequate personal protective equipment. Rescuers should be taken for medical attention, if necessary. Fire protective gear may be necessary.

DESCRIPTION OF FIRST AID MEASURES: Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Remove and isolate contaminated clothing and shoes. Seek immediate medical attention. Take copy of label and SDS to physician or other health professional with victim(s).

Inhalation: If mists, sprays or fumes of this material are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

Skin Exposure: If the material contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 20 minutes. Do not interrupt flushing. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention.

Eye Exposure: If this product enters the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 20 minutes. Do not interrupt flushing.

Ingestion: If this material is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directly by medical personnel. Have victim rinse mouth with water or give several cupfuls of water, if conscious. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions, and central nervous system conditions or skin problems may be aggravated by overexposure to this product.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: 25°C (77°F)

AUTOIGNITION: 310°C (590°F)

FLAMMABLE LIMITS IN AIR: Not determined for product. For Ethyl Silicate: LEL: 1.3%, UEL: 23.0%

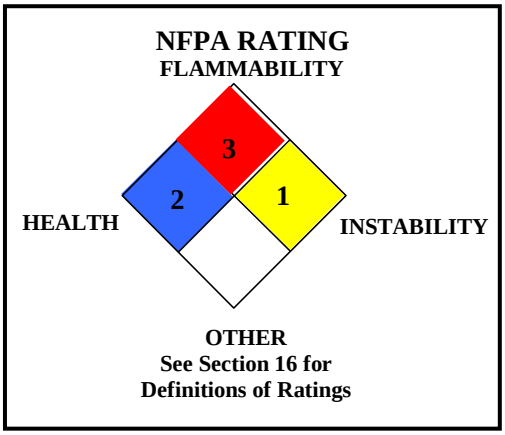
EXTINGUISHING MEDIA:

Suitable Extinguishing Media: Use materials appropriate for surrounding materials.

Unsuitable Extinguishing Media: None known.

PROTECTION OF FIREFIGHTERS:

Special Hazards Arising from the Substance: This is a highly flammable liquid. Reaction with water may cause a decrease of the flash point due to formation of volatile organic compound(s) (VOC). As a result of hydrolysis flammable vapors may accumulate in the container head space. Not sensitive to mechanical impact under normal conditions. Vapors may form explosive mixtures in air. Vapors are heavier than air and can accumulate in confined spaces creating an explosion hazard. Vapors can travel long distances and flashback to ignition source. Closed containers may develop pressure and rupture in event of fire.



Special Protective Actions for Fire-Fighters: Contact with water can product methanol and ethanol, increasing the fire hazard. Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move containers from fire area if it can be done without risk to personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES: An accidental release can result in a fire. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. Use only non-sparking tools and equipment during the response. The atmosphere must at least 19.5 percent Oxygen before non-emergency personnel can be allowed in the area without Self-Contained Breathing Apparatus and fire protection.

6. ACCIDENTAL RELEASE MEASURES (Continued)

PERSONAL PROTECTIVE EQUIPMENT: Responders should wear the level of protection appropriate to the type of chemical released, the amount of the material spilled, and the location where the incident has occurred.

Small Spills: For releases of 1 drum or less, Level D Protective Equipment (gloves, chemical resistant apron, boots, and eye protection) should be worn.

Large Spills: Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit, fire-retardant clothing and boots, hard hat, and Self-Contained Breathing Apparatus.**

METHODS FOR CLEAN-UP AND CONTAINMENT:

All Spills: Access to the spill area should be restricted. Spread should be limited by gently covering the spill with polypads. Absorb spilled liquid with clay, sand, polypads, or other suitable inert absorbent materials. All contaminated absorbents and other materials should be placed in an appropriate container and seal. Do not mix with wastes from other materials. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). Dispose of recovered material and report spill per regulatory requirements. Remove all residue before decontamination of spill area. Clean spill area with soap and copious amounts of water. Monitor area for combustible vapor levels and confirm levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, and that levels are below applicable LELs (see Section 5 – Fire Fighting Measures) before non-response personnel are allowed into the spill area. Purge equipment with inert gas prior to reuse.

ENVIRONMENTAL PRECAUTIONS: Minimize use of water to prevent environmental contamination. Prevent spill or rinsate from contaminating storm drains, sewers, soil or groundwater. Place all spill residues in a suitable container and seal. Do not discharge effluent containing this product into streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

OTHER INFORMATION: U.S. regulations may require reporting of spills of this material that reach surface waters if a sheen is formed. If necessary, the toll-free phone number for the US Coast Guard National Response Center is 1-800-424-8802.

REFERENCE TO OTHER SECTIONS: See information in Section 8 (Exposure Controls – Personal Protection) and Section 13 (Disposal Considerations) for additional information.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

PRECAUTIONS FOR SAFE HANDLING: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat or drink while handling this material. Avoid contact with eyes, skin, and clothing. Avoid breathing fumes, dusts, vapors or mist. Do not taste or swallow. Use only with adequate ventilation. Contaminated clothing needs to be laundered prior to reuse. Keep away from heat and flame. In the event of a spill, follow practices indicated in Section 6: ACCIDENTAL RELEASE MEASURES. Empty containers may contain residual product; therefore, empty containers should be handled with care. Decontaminate empty containers by filling with water or a solution of ammonium hydroxide (0-10%), detergent (2-5%), Isopropyl Alcohol (0-20%: may create a fire or vapor hazard in some situations, e.g. confined spaces; if so, do not use), water (balance of solution). Heat and CO2 gas are released when isocyanates reacts with water or solution. Let stand uncovered or loosely covered for at least 24 hours. Decontaminate (using above solution) and clean isocyanate handling equipment after use. Stand upwind of all opening, pouring and mixing operations. Keeping work areas clean is essential. Use work surfaces that can be easily decontaminated. Maintain good personal hygiene.

CONDITIONS FOR SAFE STORAGE: Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Containers should be separated from oxidizing materials by a minimum distance of 20 ft. or by a barrier of non-combustible material at least 5 ft. high having a fire-resistance rating of at least 0.5 hours. Storage areas should be made of fire resistant materials. **Local Fire Departments should be notified of the storage of this product on site. Storage and processing areas of this product should be identified with a NFPA 704 placard (diamond) large enough to be seen from a distance.** Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Refer to NFPA 30, *Flammable and Combustible Liquids Code*, for additional information on storage. Have appropriate extinguishing equipment in the storage area (such as sprinkler systems or portable fire extinguishers). Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

PRODUCT USE: This product is used as a water-based penetrating sealant. Follow all industry standards for use of this product.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

Ventilation and Engineering Controls: Use with adequate, explosion proof ventilation to ensure exposure levels are maintained below the limits provided above.

Occupational/Workplace Exposure Limits/Guidelines:

Chemical Name	CAS #	Guideline	Value
Acetic Acid	64-19-7	ACGIH TLV TWA	10 ppm
		ACGIH TLV STEL/CEIL(C)	15 ppm
		OSHA PEL TWA	10 ppm
		NIOSH REL TWA	10 ppm
		NIOSH REL STEL/CEIL(C)	15 ppm
		DFG MAK TWA	10 ppm
		DFG MAK PEAK/CEIL(C)	2•MAK 15 minute average value, 1-hr interval 4 per shift
		DFG MAK Pregnancy Risk Class	C

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

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS (continued):

OCCUPATIONAL/WORKPLACE EXPOSURE LIMITS/GUIDELINES (continued):

Chemical Name	CAS #	Guideline	Value
Amino Functional Polydimethylsiloxane	67923-07-3	None	None
Ethanol	64-17-5	ACGIH TLV STEL OSHA PEL TWA NIOSH REL TWA DFG MAK TWA DFG MAK PEAK	1000 ppm 1000 ppm 1000 ppm 500 ppm 2•MAK 15 minute average value, 1-hr interval 4 per shift
Ethyl Silicate	78-10-4	ACGIH TLV TWA OSHA PEL TWA NIOSH REL TWA NIOSH LDLH DFG MAK TWA DFG MAK PEAK DFG MAK Pregnancy Category	85 mg/m3 850 mg/m3 85 mg/m3 700 ppm 86 mg/m3 1•MAK 15 min. Average value, 1-hr interval, 4 per shift D
Isooctyl Trimethylsilane	34396-03-7	None	None
Methanol	67-56-1	ACGIH TLV TWA ACGIH TLV STEL OSHA PEL TWA OSHA PEL STEL NIOSH REL TWA NIOSH REL STEL NIOSH IDLH DFG MAK TWA DFG MAK PEAK	200 ppm (skin) 250 ppm (skin) 200 ppm 250 ppm (skin) [vacated 1989 PEL] 200 ppm (skin) 250 ppm (skin) 6000 ppm 200 ppm (skin 4•MAK 15 minute average value, 1-hr interval 4 per shift

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

PERSONAL PROTECTIVE EQUIPMENT (PPE): *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, including the Respiratory Protection Standard (29 CFR 1910.134*), *Eye Protection Standard 29 CFR 1910.13, the Hand Protection Standard 29 CFR 1910.138, and the Foot Protection Standard 29 CFR 1910.136), equivalent standards of Canada (including the Canadian CSA Respiratory Standard Z94.4-93-02, the CSA Eye Protection Standard Z94.3-M1982, Industrial Eye and Face Protectors and the Canadian CSA Foot Protection Standard Z195-M1984, Protective Footwear). Please reference applicable regulations and standards for relevant details.*

Eye/Face Protection: Use approved safety goggles or safety glasses. If necessary, refer to appropriate regulations.

Skin Protection: Wear chemical impervious gloves (e.g., Nitrile or Neoprene). Use triple gloves for spill response. If necessary, refer to appropriate regulations.

Body Protection: Use body protection appropriate for task (e.g., lab coat, coveralls, Tyvek suit). If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or appropriate Standards of Canada. 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 appropriate regulations.

Respiratory Protection: If mists or sprays from this product are created during use, use appropriate respiratory protection. If necessary, use only respiratory protection authorized in appropriate regulations. 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 appropriate regulations. The following are NIOSH respiratory equipment guidelines are presented for additional assistance in respiratory protective equipment selection.

ETHYL SILICATE

CONCENTRATION	RESPIRATORY PROTECTION
BASED ON NIOSH REL	
Up to 100 ppm:	Any Supplied-Air Respirator (SAR).
Up to 250 ppm:	Any SAR operated in a continuous-flow mode.
Up to 500 ppm:	Any Self-Contained Breathing Apparatus (SCBA) with a full facepiece, or any SAR with a full facepiece.
Up to 700 ppm:	Any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions:	Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any SAR 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, or any appropriate escape-type, SCBA.

9. PHYSICAL and CHEMICAL PROPERTIES

FORM: Liquid.
COLOR: Clear, pale yellow.
MOLECULAR WEIGHT: Mixture.
MOLECULAR FORMULA: Mixture.
ODOR: Slight
ODOR THRESHOLD: Not available
VISCOSITY: Not determined
VISCOSITY DYNAMIC @ 25°C: 1-10 mPa.s
VAPOR DENSITY: (air = 1) > 1
VAPOR PRESSURE @ 20°C: Not determined
BOILING POINT: > 65°C (> 149°F)
FLASH POINT: 25°C (77°F)
FREEZING/MELTING POINT: Not available.
pH @ 25°C: 5-6
SPECIFIC GRAVITY (water = 1) @ 25°C: 0.95-0.97 g/cm³
EVAPORATION RATE (nBuAc = 1): > 1
SOLUBILITY IN WATER: Completely miscible
OTHER SOLUBILITIES: Not available.
COEFFICIENT WATER/OIL DISTRIBUTION: Not available.
PERCENT SOLIDS: Not available.
PERCENT VOC: 30%
VOC CONTENT: 318 g/L

9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

HOW TO DETECT THIS SUBSTANCE (WARNING PROPERTIES): The odor of this product may be good warning property in the event of an accidental release.

10. STABILITY and REACTIVITY

CHEMICAL STABILITY: Stable under normal circumstances of use and handling. Reaction with water may cause a decrease of the flash point due to formation of volatile organic compound(s) (VOC). As a result of hydrolysis flammable vapors may accumulate in the container head space.

CONDITIONS TO AVOID: Avoid contact with incompatible chemicals and exposure to extreme temperatures.

INCOMPATIBLE MATERIALS: Based upon component incompatibility, this product may be incompatible with strong oxidizers and water.

HAZARDOUS DECOMPOSITION PRODUCTS: *Combustion*: Thermal decomposition of this product can generate carbon and nitrogen oxides, formaldehyde, silicon dioxides. *Hydrolysis:* Ethanol, methanol, silanol and/or siloxanol compounds..

POSSIBILITY OF HAZARDOUS REACTIONS/POLYMERIZATION: Not expected to occur.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

Contact with Skin or Eyes: Depending on the duration of skin contact, skin exposures can cause reddening, discomfort or irritation. Brief contact with the liquid or vapors from this product and the eyes can cause irritation, reddening and watering and disturbances to the vision. Eye contact may more severe irritation, depending on the duration and concentration of exposure.

Skin Absorption: Prolonged skin contact may cause adverse systemic toxicity by skin absorption as described under ingestion or inhalation.

Ingestion: If the product is swallowed, it can irritate the mouth, throat, and other tissues of the gastro-intestinal system and may cause nausea, vomiting, and diarrhea as well as adverse effects on the central nervous system. Symptoms can include dizziness, vomiting and incoordination. Ingestion of large amounts may be harmful and cause systemic toxicity and severe irritation or burns to the digestive system. Ingestion of large amount may be fatal.

Inhalation: Inhalation of vapors, mists, or sprays of this product can moderately irritate the tissues of the nose, mouth, throat, and upper respiratory system. Symptoms of overexposure may include coughing, sneezing, and difficulty breathing.

Injection: Accidental injection of this product (e.g. puncture with a contaminated object) may cause burning, redness, and swelling in addition to the wound.

TARGET ORGANS: Acute: Skin, eyes, respiratory system. Chronic: Skin, respiratory and central nervous systems.

TOXICITY DATA: There are currently no toxicity data available for this product; the following toxicology data are available for components greater than 1% in concentration. Due to the large volume of data available for components, only irritation data, human data, LD50 oral-rat or mouse, LD50 skin-rabbit or rat and LC50 inhalation-rat or mouse data are included in this SDS. Contact Pecora on other data available for components.

ACETIC ACID:

Standard Draize Test (Skin-Human) 50 mg/24 hours: Mild

TDLo (Inhalation-Human) 816 ppm/3 minutes: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Sense Organs and Special Senses (Eye): effect, not otherwise specified; Lungs, Thorax, or Respiration: other changes

TDLo (Inhalation-Human) 10 ppm/2 hours: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified

TDLo (Oral-Human) 1470 µg/kg: Gastrointestinal: changes in structure or function of esophagus, ulceration or bleeding from small intestine, ulceration or bleeding from large intestine

TDLo (Rectal-Human) 281 µL/kg: Gastrointestinal: alteration in gastric secretion; Liver: liver function tests impaired; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)

LDLo (Unreported-Man) 308 mg/kg

IC_{50} (*In vitro*-Human-Liver Tumor) 57 mmol/L/24 hours: *In Vitro* Toxicity Studies: cell protein synthesis

Standard Draize Test (Skin-Rabbit) 50 mg/24 hours: Mild

Open Irritation Test (Skin-Rabbit) 525 mg: Severe

Rinsed with Water (Eye-Rabbit) 5 mg/30 seconds: Mild

LC_{50} (Inhalation-Rat) 11,000 mg/m^3/4 hours

LC_{50} (Inhalation-Mouse) 5620 ppm/1 hour: Sense Organs and Special Senses (Eye): conjunctive irritation, effect, not otherwise specified; Blood: other changes

LC_{50} (Inhalation-Mouse) 5620 mg/m^3/1 hour

LC_{50} (Inhalation-Mouse) 5620 ppm/1 hour

LC_{50} (Inhalation-Mammal-Species Unspecified) 11.4 gm/m^3/4 hours

LD_{50} (Oral-Rat) 3310 mg/kg

LD_{50} (Oral-Mouse) 4960 mg/kg

LD_{50} (Oral-Mammal-Species Unspecified) 4960 mg/kg

LD_{50} (Skin-Rabbit) 1060 µL/kg

LD_{50} (Skin-Rabbit) 1060 mg/kg

LD_{50} (Skin-Mammal-Species Unspecified) 1060 mg/kg

LD_{50} (Intravenous-Mouse) 525 mg/kg: Behavioral: convulsions or effect on seizure threshold

LD_{50} (Intravenous-Mouse) 525 mg/kg

LCLo (Inhalation-Rat) 16,000 ppm/4 hours

LDLo (Oral-Rabbit) 600 mg/kg

LDLo (Subcutaneous-Rabbit) 600 mg/kg

LDLo (Rectal-Rabbit) 600 mg/kg

TDLo (Oral-Rat) 0.33 mL/kg/1 minute: Gastrointestinal: ulceration or bleeding from stomach

TDLo (Oral-Rat) 0.48 mL/kg: Gastrointestinal: ulceration or bleeding from stomach

TDLo (Oral-Rat) 5760 mg/kg/32 weeks-intermittent: Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Gastrointestinal: tumors Tumorigenic: facilitates action of known carcinogen

TDLo (Oral-Rat) 700 mg/kg: lactating female 18 day(s) post-birth: Reproductive: Effects on Newborn: behavioral

TDLo (Oral-Rat) 22,680 mg/kg/9 weeks-continuous: Behavioral: food intake (animal); Nutritional and Gross Metabolic: weight loss or decreased weight gain

ACETIC ACID (continued):

TDLo (Skin-Rat) 0.25 mg/kg: Gastrointestinal: ulceration or bleeding from duodenum

TDLo (Skin-Rabbit) 0.04 gm/kg/24 hours: Skin and Appendages: primary irritation (after topical exposure)

TDLo (Intratesticular-Rat) 400 mg/kg: male 1 day(s) pre-mating: Reproductive: Fertility: male fertility index (e.g. # males impregnating females per # males exposed to fertile non-pregnant females)

TDLo (Intraperitoneal-Mouse) 50 mg/kg: Behavioral: analgesia

TDLo (Intraperitoneal-Mouse) 93.75 mg/kg: Behavioral: convulsions or effect on seizure threshold

TDLo (Implant-Rat) 10 mg/kg: Gastrointestinal: ulceration or bleeding from stomach; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other oxidoreductases; Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Rectal-Rat) 200 mg/kg: Gastrointestinal: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other oxidoreductases

TDLo (Rectal-Rat) 0.24 mL/kg: Gastrointestinal: ulceration or bleeding from large intestine

TDLo (Rectal-Rat) 300 mg/kg: Gastrointestinal: ulceration or bleeding from large intestine, necrotic changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: multiple enzyme effects

TDLo (Rectal-Rat) 240 mg/kg: Gastrointestinal: ulceration or bleeding from large intestine; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other oxidoreductases; Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Rectal-Rat) 0.34 mL/kg: Gastrointestinal ulceration or bleeding from large intestine; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other oxidoreductases; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Parenteral-Rat) 0.263 mL/kg: Gastrointestinal: ulceration or bleeding from stomach, other changes

TCLo (Inhalation-Rat) 5070 $\mu g/m^3$/24 hours/95 days-continuous: Kidney/Ureter/Bladder: other changes in urine composition; Blood: changes in leukocyte (WBC) count; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: true cholinesterase

TCLo (Inhalation-Rat) 23 ppm/17 days-continuous: Kidney/Ureter/Bladder: changes in kidney weight; Endocrine: changes in spleen weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TCLo (Inhalation-Rat) 15 ppm/22 days-continuous: Behavioral: somnolence (general depressed activity)

TCLo (Inhalation-Mouse) 12 ppm/6 minutes: Lungs, Thorax, or Respiration: respiratory depression

TCLo (Inhalation-Mouse) 330 ppm: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified

Sister Chromatid Exchange (Human Lymphocyte) 5 mmol/L

Mutation in Microorganisms (Bacteria-*Escherichia coli*) 300 ppm/3 hours

Sex Chromosome Loss and Non-Disjunction (Oral-*Drosophila melanogaster*) 1000 ppm

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

ACETIC ACID (continued):

Sex Chromosome Loss and Non-Disjunction (Inhalation-*Drosophila melanogaster*) 1000 ppm/24 hours

Cytogenetic Analysis (Parenteral-grasshopper) 40 mmol/L

Cytogenetic Analysis (Hamster Ovary) 10 mmol/L

Unscheduled DNA Synthesis (Skin-Mouse) 79,279 µg/kg

Mutation Test Systems-Not Otherwise Specified (Skin-Mouse) 1201 mg/kg

ETHYL SILICATE:

Standard Draize Test (Eye-Human) 3000 ppm

Standard Draize Test (Skin-Rabbit) 500 mg/24 hours: Moderate

Standard Draize Test (Eye-Rabbit) 100 mg: Mild

Standard Draize Test (Eye-Rabbit) 500 mg/24 hours: Mild

Standard Draize Test (Eye-Guinea Pig) 2500 ppm/2 hours: Severe

LD_{50} (Oral-Rat) 6270 mg/kg

LD_{50} (Skin-Rat) 6300 µL/kg

LC_{50} (Inhalation-Mouse) 30 gm/m^3: Behavioral: ataxia; Lungs, Thorax, or Respiration: acute pulmonary edema; Gastrointestinal: changes in structure or function of salivary glands

LDLo (Oral-Rat) 2800 mg/kg: Kidney/Ureter/Bladder: urine volume increased, other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain

LDLo (Oral-Rat) 1000 mg/kg: Liver: fatty liver degeneration, other changes; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)

LDLo (Intravenous-Rat) 0.6 mL/kg: Lungs, Thorax, or Respiration: other changes; Vascular: structural changes in vessels; Blood: hemorrhage

LDLo (Intravenous-Rabbit) 400 mg/kg: Lungs, Thorax, or Respiration: pleural effusion; Kidney/Ureter/Bladder: interstitial nephritis; Blood: other hemolysis with or without anemia

LDLo (Intravenous-Rabbit) 0.02 mL/kg: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Behavioral: general anesthetic, tremor

LDLo (Intravenous-Rabbit) 0.2 mL/kg: Lungs, Thorax, or Respiration: other changes; Vascular: structural changes in vessels; Blood: hemorrhage

LDLo (Intraperitoneal-Rat) 0.6 mL/kg: Behavioral: ataxia; Lungs, Thorax, or Respiration: changes in pulmonary vascular resistance, acute pulmonary edema

LDLo (Intraperitoneal-Mouse) 830 mg/kg: Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis); Blood: changes in spleen; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (Oral-Rat) 0.555 mg/kg: Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis), inflammation, necrosis, or scarring of bladder, other changes

TDLo (Oral-Rat) 1.11 mg/kg/2 days-continuous: Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis), inflammation, necrosis, or scarring of bladder, other changes

TDLo (Oral-Rat) 2.22 mg/kg/4 days-continuous: Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis), inflammation, necrosis, or scarring of bladder, other changes

LC (Inhalation-Mouse) 10 gm/m^3/2 hours: Brain and Coverings: changes in circulation (hemorrhage, thrombosis, etc.), other degenerative changes; Behavioral: somnolence (general depressed activity)

LC (Inhalation-Mouse) 20 gm/m^3/2 hours: Cardiac: other changes; Lungs, Thorax, or Respiration: changes in pulmonary vascular resistance, respiratory obstruction

LC (Inhalation-Mouse) 30 gm/m^3/2 hours: Liver: other changes; Kidney/Ureter/Bladder: changes in blood vessels or in circulation of kidney; Blood: changes in spleen

LC (Inhalation-Mouse) 50 gm/m^3/2 hours: Behavioral: toxic psychosis, convulsions or effect on seizure threshold; Lungs, Thorax, or Respiration: cyanosis

LC (Inhalation-Mouse) 60 gm/m3: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Behavioral: somnolence (general depressed activity), tremor

LCLo (Inhalation-Rat) 9 gm/m3/4 hours: Liver: other changes; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis); Blood: normocytic anemia

ETHYL SILICATE (continued):

LCLo (Inhalation-Rat) 10 gm/m3/3 hours: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Sense Organs and Special Senses (Eye): corneal damage; Behavioral: tremor

LCLo (Inhalation-Rat) 1000 ppm/4 hours

LCLo (Inhalation-Rat) 21 gm/m3/3 hours: Vascular: other changes; Lungs, Thorax, or Respiration: changes in pulmonary vascular resistance, acute pulmonary edema

LCLo (Inhalation-Rat) 21 gm/m3/3 hours: Brain and Coverings: changes in circulation (hemorrhage, thrombosis, etc.); Behavioral: ataxia; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)

LCLo (Inhalation-Rat) 1 gm/m3/3 hours: Liver: other changes; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis); Blood: hemorrhage

LCLo (Inhalation-Mouse) 1 gm/m^3/2 hours: Behavioral: general anesthetic; Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)

LCLo (Inhalation-Mouse) 20 gm/m^3: Kidney/Ureter/Bladder: interstitial nephritis; Blood: changes in erythrocyte (RBC) count, changes in leukocyte (WBC) count

LCLo (Inhalation-Guinea Pig) 700 ppm/6 hours: Behavioral: general anesthetic; Lungs, Thorax, or Respiration: acute pulmonary edema; Kidney/Ureter/Bladder: interstitial nephritis

LCLo (Inhalation-Guinea Pig) 10 gm/m^3/3 hours: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Sense Organs and Special Senses (Eye): corneal damage; Behavioral: tremor

LCLo (Inhalation-Guinea Pig) 21 gm/m^3/3 hours: Brain and Coverings: changes in circulation (hemorrhage, thrombosis, etc.); Behavioral: ataxia; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)

LCLo (Inhalation-Mammal-Species Unspecified) 4500 mg/m^3: Lungs, Thorax, or Respiration: acute pulmonary edema; Liver: fatty liver degeneration; Blood: other changes

LCLo (Inhalation-Mammal-Species Unspecified) 4.5 gm/m^3: Sense Organs and Special Senses (Eye): conjunctive irritation; Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi

LCLo (Inhalation-Mammal-Species Unspecified) 3.2 gm/m^3

TCLo (Inhalation-Rat) > 5.9 gm/m3/3 hours: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Behavioral: somnolence (general depressed activity), tremor

TCLo (Inhalation-Rat) 1000 ppm/7 hours/3 days-intermittent: Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis), hematuria; Related to Chronic Data: death

TCLo (Inhalation-Rat) 1.5 gm/m^3/17 days-intermittent: Nutritional and Gross Metabolic: weight loss or decreased weight gain; Related to Chronic Data: death

TCLo (Inhalation-Rat) 32 gm/m^3/2 days-intermittent: Related to Chronic Data: death

TCLo (Inhalation-Rat) 0.2 gm/m^3/61 days-intermittent: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Liver: liver function tests impaired

TCLo (Inhalation-Rat) 0.2 gm/m^3/153 days-intermittent: Brain and Coverings: other degenerative changes; Cardiac: changes in coronary arteries; Blood: changes in spleen

TCLo (Inhalation-Rat) 21 gm/m^3/2 hours: Sense Organs and Special Senses (Eye): conjunctive irritation; Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi, dyspnea

TCLo (Inhalation-Mouse) 200 ppm/6 hours/4 weeks-intermittent: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis); Nutritional and Gross Metabolic: weight loss or decreased weight gain

TCLo (Inhalation-Mouse) 200 ppm/6 hours/2 weeks-intermittent: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Kidney/Ureter/Bladder: other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TCLo (Inhalation-Guinea Pig) > 5.9 gm/m^3/3 hours: Behavioral: ataxia; Lungs, Thorax, or Respiration: acute pulmonary edema; Gastrointestinal: changes in structure or function of salivary glands

CARCINOGENIC POTENTIAL: The following table summarizes the carcinogenicity listing for the components of this product. "NO" indicates that the substance is not considered to be or suspected to be a carcinogen by the listed agency, see section 16 for definitions of other ratings.

CHEMICAL	IARC	EPA	NTP	NIOSH	ACGIH	OSHA	PROP 65
Acetic Acid	No	No	No	No	No	No	No
Amino Functional Polydimethylsiloxane	No	No	No	No	No	No	No
Ethanol	No	No	No	No	A3	No	No
Ethyl Silicate	No	No	No	No	No	No	No
Isooctyl Trimethylsilane	No	No	No	No	No	No	No
Methanol	No	No	No	No	No	No	No

ACGIH TLVA3: Confirmed Animal Carcinogen with Unknown Relevance to Humans.

IRRITANCY OF PRODUCT: This product is irritating by all routes of exposure.

SENSITIZATION TO THE PRODUCT: This product is not expected to cause sensitization effects.

TOXICOLOGICAL SYNERGISTIC PRODUCTS: No information available.

REPRODUCTIVE TOXICITY INFORMATION: This product has not been tested for reproductive toxicity. The following information is available for some components.

Mutagenicity / Embryotoxicity / Teratogenicity / Reproductive Toxicity: No information is available for components.

BIOLOGICAL EXPOSURES INDICES (BEIs): Currently, no BEI's have been established for components.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil. The following information is available for the main solvent components.

ETHYL SILICATE: Using a structure estimation method based on molecular connectivity indices, the Koc can be estimated to be 1. According to a classification scheme, this estimated Koc value suggests that this compound is expected to have very high mobility in soil.

12. ECOLOGICAL INFORMATION (Continued)

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. The following information is available for the main solvent components.

ETHYL SILICATE: If released to air, a vapor pressure of 1.88 mm Hg at 25°C indicates this compound will exist solely in the vapor phase in the atmosphere. Vapor-phase material will be 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. This compound does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight. If released to soil, this material is expected to have very high mobility based upon an estimated Koc of 1. Volatilization from moist soil surfaces may be an important fate process based upon an estimated Henry's Law constant of 2.0X10-5 atm-cu m/mole. This compound may volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation data were not available. If released into water, tetraethyl silicate is not expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from water surfaces may be an important fate process based upon this compound's estimated Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 2.9 and 25 days respectively. This compound is expected to undergo hydrolysis in aqueous environmental conditions, or on contact with water; without special precautions, tetraethoxysilane hydrolyzes to a gel in about 10 days.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential. The following values are available for the Ethyl Silicate component.

ETHYL SILICATE: An estimated BCF of 3 was calculated for this compound, using an estimated log Kow of 0.04(1) and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is low.

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All release to terrestrial, atmospheric and aquatic environments should be avoided. No data are available.

OTHER ADVERSE EFFECTS: This material is not expected to have any ozone depletion potential.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: As supplied, this product would be a hazardous waste as defined by U.S. federal regulation (40 CFR 261) if discarded or disposed. It has the characteristic of Ignitibility. State and local regulations may differ from federal regulations. The generator of the waste is responsible for proper waste determination and management.

U.S. EPA WASTE NUMBER: D001.

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: This product is classified as Dangerous Goods, per U.S. DOT regulations, under 49 CFR 172.101.

UN Identification Number:	UN 1993
Proper Shipping Name:	Flammable liquid, n.o.s. (Trimethoxy(2,4,4-trimethylpentyl)silane)
Hazard Class Number and Description:	3 (Flammable)
Packing Group:	PG III
Dot Label(s) Required:	Class 3 (Flammable)
North American Emergency Response Guidebook Number (2012):	128

Marine Pollutant: No component meets the criteria of a Marine Pollutant (as defined by 49 CFR 172.101.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods, per regulations of Transport Canada.

UN Identification Number:	UN 1993
Proper Shipping Name:	Flammable liquid, n.o.s. (Trimethoxy(2,4,4-trimethylpentyl)silane)
Hazard Class Number and Description:	3 (Flammable)
Packing Group:	PG III
Hazard Shipping Label(s) Required:	Class 3 (Flammable)
Special Provisions:	16
Explosive Limit & Limited Quantity Index:	5
ERAP Index:	None
Passenger Carrying Ship Index:	None
Passenger Carrying Road or Rail Vehicle Index:	60

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is classified as dangerous goods, per the International Air Transport Association.

UN Identification Number:	UN 1993
Proper Shipping Name:	Flammable liquid, n.o.s. (Trimethoxy(2,4,4-trimethylpentyl)silane)
Hazard Class Number and Description:	3 (Flammable)
Packing Group:	PG III
Hazard Shipping Label(s) Required:	Class 3 (Flammable)
Excepted Quantities:	E1
Passenger and Cargo Aircraft Packing Instruction:	355
Passenger and Cargo Aircraft Maximum Net Quantity per Pkg.:	60 L
Passenger and Cargo Aircraft Limited Quantity Packing Instruction:	Y344
Passenger and Cargo Aircraft Limited Quantity Maximum Net Quantity per Pkg.:	10 L
Cargo Aircraft Only Packing Instruction:	366
Cargo Aircraft Only Maximum Net Quantity per Pkg.:	220 L
Special Provisions:	A3
ERG Code:	8L

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is classified as dangerous goods, per the International Maritime Organization.

UN No.:	1993
Proper Shipping Name:	Flammable liquid, n.o.s. (Trimethoxy(2,4,4-trimethylpentyl)silane)
Hazard Class Number:	3 (Flammable)
Packing Group:	III

14. TRANSPORTATION INFORMATION (Continued)

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO) [continued]:

Labels:	Class 3 (Flammable)
Special Provisions:	223, 274, 955
Limited Quantities:	5 L
Excepted Quantities:	E1
Packing:	Instructions: P001; Provisions: LP01
IBCs:	Instructions: IBC03; Provisions: None
Tanks:	Instructions: T7; Provisions: TP1, TP29
EmS:	F-E, S-E
Stowage Category:	Category A.

Marine Pollutant: No component meets the criteria of a marine pollutant.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA Reporting Requirements: No component of this product is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

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

U.S. TSCA Inventory Status: All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

U.S. CERCLA Reportable Quantity (RQ): Not applicable.

U.S. Clean Air Act (CA 112r) Threshold Quantity (TQ): Not applicable.

U.S. Clean Water Act Requirements: Not applicable.

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): No component is on the California Proposition 65 lists.

ADDITIONAL CANADIAN REGULATIONS:

Canadian DSL/NDSL Inventory Status: The components of this product are on the DSL Inventory.

Canadian Environmental Protection Act (CEPA) Priorities Substances Lists: Not applicable.

Canadian WHMIS Regulations: This product is classified as a Controlled Product, Hazard Classes B2 (Flammable Liquid); D2B (Poisonous and Infectious Material, Other effects/Toxic: Eye Irritation, Skin Irritation) as per the Controlled Product Regulations.

ADDITIONAL MEXICAN REGULATIONS:

Mexican Workplace Regulations (NOM-018-STPS-2000): This product is classified as hazardous.

16. OTHER INFORMATION

U.S. ANSI STANDARD LABELING (Precautionary Statements): DANGER! FLAMMABLE LIQUID. MAY BE HARMFUL IF INHALED OR INGESTED. MAY CAUSE EYE, SKIN AND RESPIRATORY IRRITATION; EYE IRRITATION MAY BE SEVERE. INGESTION AND VAPORS MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. Avoid contact with eyes, skin, and clothing. Avoid breathing mist, vapors or fume. Do not taste or swallow. Wash thoroughly after handling. Keep container tightly closed. Use only with adequate ventilation. Keep away from heat and flame. Wear gloves, eye protection, respiratory protection, and appropriate body protection. FIRST-AID: In case of contact, immediately flush skin and eyes with plenty of water. Remove 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 CO_2. IN CASE OF SPILL: Absorb spilled product with polypads or other suitable absorbing material. Place all spill residue in an appropriate container and seal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations and those of Canada.

GLOBAL HARMONIZATION SYSTEM CLASSIFICATION:

Classification: Flammable Liquid Category 3, Skin Irritation Category 2, Eye Irritation Category 2A, Specific Target Organ Toxicity (Inhalation-Central Nervous System, Respiratory Irritation) Single Exposure Category 2, Specific Target Organ Toxicity (Inhalation-Central Nervous System) Single Exposure Category 3

Signal Word: Danger

Hazard Statements: H226: Flammable liquid and vapor. H315: Causes skin irritation. H319: Causes serious eye irritation. H335: May cause respiratory irritation. H336: May cause drowsiness or dizziness.

Precautionary Statements:

Prevention: P210: Keep away from heat/sparks/open flames/hot surfaces. — No smoking. P240: Ground/bond container and receiving equipment. P241: Use explosion-proof electrical/ventilating/lighting/equipment. P242: Use only non-sparking tools. P243: Take precautionary measures against static discharge. P261: Avoid breathing mists, sprays, fume. P264: Wash contaminated tissues after handling. P270: Do not eat, drink or smoke when using this product. P271: Use only outdoors or in a well-ventilated area. P280: Wear protective gloves, clothing, eye protection and face protection.

Response: P370 + P378: In case of fire: Use materials appropriate for surrounding fire for extinction. Water should be used with care. P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P304 + P340: If inhaled, remove victim to fresh air and keep at rest in a position comfortable for breathing. P312: Call a POISON CENTER or doctor/physician if you feel unwell. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. P302 + P352: IF ON SKIN: Wash with plenty of soap and water. P332 + P313: If skin irritation occurs, get medical attention. P362 + P364: Take off contaminated clothing and wash it before reuse. P321: Specific treatment (remove from exposure and treat symptoms).

Storage: P403 + P233 + P235: Store in a well-ventilated place. Keep container tightly closed. Keep cool. P405: Store locked up.

Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Hazard Symbols/Pictograms: GHS02, GHS07

16. OTHER INFORMATION (Continued)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information presented in this Safety Data Sheet is presented in good faith based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. In no case shall the descriptions, information, data or designs provided be considered a part of our terms and conditions of sale.

All materials may present hazards and should be used with caution. Because many factors may affect processing or application/use, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices or applicable federal, state, or local laws or regulations. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

REFERENCES AND DATA SOURCES: Contact the supplier for information.

METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION: Bridging principles were used to classify this product.

REVISION DETAILS: May 2012: Up-date and revise entire SDS to include current GHS requirements; change in formulation. March 2013: Change of flash point and up-date of SDS appropriately. Addition of complete information for Isopropyl Alcohol component. September 2014: Change of formulation.

DATE OF PRINTING September 25, 2014

DEFINITIONS OF TERMS

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

KEY ACRONYMS:

CHEMTREC: Chemical Transportation Emergency Center, a 24-hour emergency information and/or emergency assistance to emergency responders.

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

DFG MAKs: Federal Republic of Germany Maximum Concentration Values in the workplace. Exposure limits are given as TWA (Time-Weighted Average) or PEAK (short-term exposure) values.

DFG MAK Germ Cell Mutagen Categories: 1: Germ cell mutagens that have been shown to increase the mutant frequency in the progeny of exposed humans. **2:** Germ cell mutagens that have been shown to increase the mutant frequency in the progeny of exposed mammals. **3A:** Substances that 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 that 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 that 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.

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.

DFG MAK Pregnancy Risk Group Classification (continued): 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.

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

NIC: Notice of Intended Change.

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: 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 a there is a danger of cutaneous absorption.

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

WEEL: Workplace Environmental Exposure Limits from the AIHA.

HAZARD RATINGS:

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. Mechanical irritation may occur. PII or Draize = 0. *Eye Irritation*: Essentially non-irritating, minimal effects clearing in < 24 hours. Mechanical irritation may occur. Draize = 0. *Oral Toxicity LD_{50} Rat*: > 5000 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 2000 mg/kg. *Inhalation Toxicity 4-hrs LC_{50} Rat*: > 20 mg/L. **1** Slight Hazard: Minor reversible injury may occur; may irritate the stomach if swallowed; may defat the skin and exacerbate existing dermatitis. *Skin Irritation*: Slightly or mildly irritating. PII or Draize > 0 < 5. *Eye Irritation*: Slightly to mildly irritating, but reversible within 7 days. Draize > 0 ≤ 25. *Oral Toxicity LD_{50} Rat*: > 500–5000 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 1000–2000 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 2–20 mg/L. **2** Moderate Hazard: Temporary or transitory injury may occur; prolonged exposure may affect the CNS. *Skin Irritation*: Moderately irritating; primary irritant; sensitizer. PII or Draize ≥ 5, with no destruction of dermal tissue. *Eye Irritation*: Moderately to severely irritating; reversible corneal opacity; corneal involvement or irritation clearing in 8–21 days. Draize = 26–100, with reversible effects. *Oral Toxicity LD_{50} Rat*: > 50–500 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 200–1000 mg/kg. *Inhalation Toxicity LC_{50} 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 cause destruction of dermal tissue, skin burns, and 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 LD_{50} Rat*: > 1–50 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 20–200 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.05–0.5 mg/L. **4** Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposures; extremely toxic; irreversible injury may result from brief contact. *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 LD_{50} Rat*: ≤ 1 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: ≤ 20 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: ≤ 0.05 mg/L.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

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 requires considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur. This usually includes the following: 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) (i.e. OSHA Class IIIB); and 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 with air. This usually includes the following: 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); and Solids and semisolids (e.g. viscous and slow flowing as asphalt) that readily give off flammable vapors. **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. This usually includes the following: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 38°C (100°□F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (100°F) (i.e. 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); and 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 that will burn readily. This usually includes the following: 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) (i.e. OSHA Class IA); and Materials that ignite spontaneously when exposed to air at a temperature of 54.4°C (130°F) or below (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. *Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No 0 rating. *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 violently. *Explosives*: Division 1.5 & 1.6 explosives. 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 oxidizers; 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 explosion 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 explosives. Explosive substances where the explosive effects 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 oxidizers. 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 (or low risk) 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 1.3 explosives. 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 oxidizers. 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 (or moderate risk) to cause significant heat generation or explosion. **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 explosives. 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 (or high risk) to cause significant heat generation or explosion. *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 (or high risk) to cause significant heat generation or explosion.

DEFINITIONS OF TERMS (Continued)

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 with an LC_{50} for acute inhalation toxicity greater than 10,000 ppm. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 200 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 2000 mg/kg. Materials with an LD_{50} for acute oral toxicity greater than 2000 mg/kg. Materials essentially non-irritating to the respiratory tract, eyes, and skin. **1** Materials that, under emergency conditions, can cause significant irritation. Gases and vapors with an LC_{50} for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials that slightly to moderately irritate the respiratory tract, eyes and skin. Materials with an LD_{50} for acute oral toxicity greater than 500 mg/kg but less than or equal to 2000 mg/kg. **2** Materials that, under emergency conditions, can cause temporary incapacitation or residual injury. Gases with an LC_{50} for acute inhalation toxicity greater than 3,000 ppm but less than or equal to 5,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC_{50} for acute inhalation toxicity, if its LC_{50} 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. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 2 mg/L but less than or equal to 10 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 200 mg/kg but less than or equal to 1000 mg/kg. 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. Materials whose LD_{50} for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. **3** Materials that, under emergency conditions, can cause serious or permanent injury. Gases with an LC_{50} for acute inhalation toxicity greater than 1,000 ppm but less than or equal to 3,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials corrosive to the skin. Cryogenic gases that cause frostbite and irreversible tissue damage. Compressed liquefied gases with boiling points below -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials with an LD_{50} for acute oral toxicity greater than 5 mg/kg but less than or equal to 50 mg/kg. **4** Materials that, under emergency conditions, can be lethal. Gases with an LC_{50} for acute inhalation toxicity less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than ten times its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 1000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD_{50} for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD_{50} for acute oral toxicity is less than or equal to 5 mg/kg.

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 according with Annex D of NFPA 704. **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 according with Annex D of NFPA 704. 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 *Recommendations 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% 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 the 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). Most ordinary combustible materials. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **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 with 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% 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 (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 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% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): **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% 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 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 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 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 are sensitive to localized thermal or mechanical shock 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.

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 vapor to form an ignitable mixture with air near the surface of the liquid or within the test vessel used. Autoignition Temperature: Minimum temperature of a solid, liquid, or gas required to initiate or cause self-sustained combustion in air with no other source of ignition. LEL: Lowest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame. UEL: Highest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame.

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. LD_{50}: Lethal Dose (solids & liquids) that kills 50% of the exposed animals. LC_{50}: Lethal Concentration (gases) that kills 50% of the exposed animals. ppm: Concentration expressed in parts of material per million parts of air or water. mg/m^3: 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. TDLo: Lowest dose to cause a symptom. TCLo: Lowest concentration to cause a symptom. TDo, LDLo, and LDo, or TC, TCo, LCLo, and LCo: Lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** IARC: International Agency for Research on Cancer. NTP: National Toxicology Program. RTECS: Registry of Toxic Effects of Chemical Substances. 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.

REPRODUCTIVE INFORMATION: A mutagen is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin 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.

ECOLOGICAL INFORMATION:

EC: Effect concentration in water. BCF: Bioconcentration Factor, which is used to determine if a substance will concentrate in life forms that consume contaminated plant or animal matter. TLm: Median threshold limit. log K_{OW} or log K_{OC}: Coefficient of Oil/Water Distribution is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION: This section explains the impact of various laws and regulations on the material.

U.S.:

EPA: U.S. Environmental Protection Agency. ACGIH: American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. OSHA: U.S. Occupational Safety and Health Administration. NIOSH: National Institute of Occupational Safety and Health, which is the research arm of OSHA. DOT: U.S. Department of Transportation. TC: Transport Canada. SARA: Superfund Amendments and Reauthorization Act. TSCA: U.S. Toxic Substance Control Act. CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act. Marine Pollutant status according to the DOT; CERCLA or Superfund; and various state regulations. This section also includes information on the precautionary warnings that appear on the material's package label.

CANADA:

WHMIS: Canadian Workplace Hazardous Materials Information System. TC: Transport Canada. DSL/NDSL: Canadian Domestic/Non-Domestic Substances List.