

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

1. PRODUCT IDENTIFICATION

<u>TRADE NAME (AS LABELED):</u>	ATAC[®] SERUM CONTROL KIT
<u>PRODUCT NUMBER (AS LABELED):</u>	314-060
<u>CHEMICAL FORMULA:</u>	Not Applicable-Mixture
<u>SYNONYMS:</u>	None
<u>U.N. NUMBER:</u>	Not Applicable
<u>U.N. DANGEROUS GOODS CLASS/SUBSIDIARY RISK:</u>	Not Applicable
<u>HAZCHEM CODE (AUSTRALIA):</u>	Not Applicable
<u>POISONS SCHEDULE NUMBER (AUSTRALIA):</u>	Not Applicable
<u>PRODUCT USE:</u>	Medical Diagnostics
<u>U.S. SUPPLIER/MANUFACTURER'S NAME:</u>	Vital Diagnostics
<u>ADDRESS:</u>	27 Wellington Road Lincoln, RI 02865 USA
<u>EMERGENCY PHONE:</u>	United States/Canada: 1-760-602-8700 (3E Company) [24-hours] International: 01-760-602-8700 (3E Company) [24-hours]
<u>BUSINESS PHONE:</u>	1-401-642-8400; 1-800-345-2822
<u>EMAIL ADDRESS/COMPETENT PERSON FOR MSDS</u>	Technical Services: techserv@vitaldiagnostics.com
<u>DATE OF PREPARATION:</u>	December 17, 2007

NOTE: ALL Canadian WHMIS, European Union and Australian NOHSC required information is included in appropriate sections based on the U.S. ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the countries listed above and the MSDS contains all the information required by the Canadian WHMIS (Controlled Products Regulations), European Union [Regulation (EC) 1907/2006 Annex II], and Australian [NOHSC:2011 (2003)].

2. HAZARD IDENTIFICATION

EU/AUSTRALIAN LABELING/CLASSIFICATION: This product does not meet the definition of any hazard class as defined by the European Union Council Directive 67/548/EEC and subsequent Directives and by the Australian National Occupational Health and Safety Commission [NOHSC(1008:2004)].

CLASSIFICATION: Not Classified

RISK PHRASES: Not Applicable

SAFETY PHRASES: Not Applicable

HAZARD SYMBOL: Not Applicable

EMERGENCY OVERVIEW: Product Description: The components of this product are slightly yellow, odorless, lyophilized powders. **Health Hazards:** The chief hazard in event of contamination or overexposure to the components of this product is the potential for mild irritation of contaminated skin or eyes. The source materials in the components of this product have been tested for human immunodeficiency virus (HIV1, HIV2) antibody, hepatitis B surface antigen (HBsAg), and hepatitis C (HCV) antibody and found to be non-reactive. However, no known test method can offer complete assurance that products derived from human blood will not transmit infectious agents. It is prudent practice to regard the components of this product as potentially infectious materials and to handle them in accordance with Universal Precautions and the OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030). **Flammability Hazards:** The components of this product must be substantially pre-heated before ignition can occur. If the components of this product are ignited, the decomposition products generated will include irritating vapors and toxic gases (e.g., carbon oxides, nitrogen oxides, sulfur oxides, sodium chloride, and hydrogen chloride). **Reactivity Hazards:** Negligible. **Environmental Hazards:** Negligible. **Emergency Recommendations:** Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

This Material Safety Data sheet describes the ATAC[®] SERUM CONTROL KIT. This product consists of the following two reagents: ATAC Serum Control 1 and ATAC Serum Control 2.

CHEMICAL NAME	% w/v	CAS #	EINECS #	AIC INVENTORY LISTING	EU/AUSTRALIAN CLASSIFICATION FOR COMPONENTS
COMPONENTS 1 & 2: ATAC SERUM CONTROL 1 & ATAC SERUM CONTROL 2					
Blood Extracts	35–50	68070-90-6	268-338-3	Not Listed	Hazard Classification: Not established. Risk Phrases: Not established.
D-Lactose Monohydrate	20–35	10039-26-6	Listed as Anhydrous: 200-559-2	Excepted as a Hydrate	Hazard Classification: Not established. Risk Phrases: Not established.
Cholesterol	1–5	57-88-5	200-353-7	Listed	Hazard Classification: Not established. Risk Phrases: Not established.
Glucose	1–5	50-99-7	200-075-7	Listed	Hazard Classification: Not established. Risk Phrases: Not established.
4-(2-Hydroxyethyl)piperazine-1-ethanesulfonic Acid	1–5	7365-45-9	230-907-9	Listed	Hazard Classification: Not established. Risk Phrases: Not established.
Sodium Acetate Trihydrate	1–5	6131-90-4	Listed as Anhydrous: 204-823-8	Listed	Hazard Classification: Not established. Risk Phrases: Not established.
Sodium Chloride	1–5	7647-14-5	231-598-3	Listed	Hazard Classification: Not established. Risk Phrases: Not established.
Other constituents. Each of the other constituents is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).	The remaining constituents do not contribute any significant additional hazards. All pertinent information has been provided in this document, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, and Canadian Workplace Hazardous Materials Identification System Standards (CPR 4).				Balance

See Section 16 for full text of Ingredient Risk Phrases

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

4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention. Remove or cover gross contamination to avoid exposure to rescuers. Rescuers should be taken for medical attention if necessary. Take a copy of label and MSDS to physician or health professional with victim.

SKIN EXPOSURE: Basic hygiene should prevent any problems. If contact with the components of this product causes redness, inflammation, or irritation, flush the exposed area with running water. Remove any contaminated clothing, taking care not to contaminate eyes. Seek medical attention if adverse effect occurs after flushing.

EYE EXPOSURE: If airborne dusts of the components of this product enter 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 15 minutes. Seek medical attention if adverse effect occurs after flushing.

INHALATION: If airborne dusts of the components 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 occurs after removal to fresh air.

INGESTION: If the components of this product are 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 vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Seek medical attention if adverse effect occurs.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing dermatitis and other skin conditions may be aggravated by overexposure to components of this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

(LEL): Not applicable. (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: In the event of a fire, use suppression methods for surrounding materials.

Water Spray: Yes **Carbon Dioxide:** Yes **Dry Chemical:** Yes

Halon: Yes **Other:** Any "ABC" Class. **Foam:** Yes

FIRE EXTINGUISHING MATERIALS NOT BE USED: None known.

UNUSUAL FIRE AND EXPLOSION HAZARDS: The components of this product must be substantially pre-heated before ignition can occur. If involved in a fire, this material may decompose and produce irritating vapors and toxic gases (including carbon oxides, nitrogen oxides, sulfur oxides, sodium chloride, and hydrogen chloride). Accumulated dusts of the components of this product can create a serious hazard of explosion.

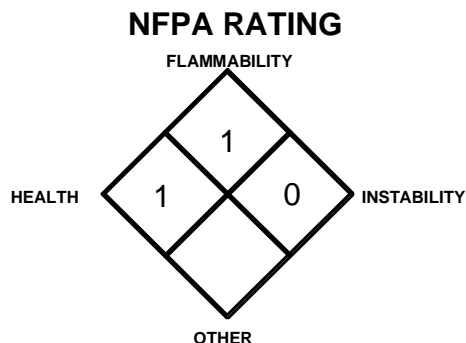
5. FIRE-FIGHTING MEASURES (Continued)

UNUSUAL FIRE AND EXPLOSION HAZARDS (continued): If the fire scene includes high levels of airborne dusts from the components of this product, firefighters should take great care as an explosive ignition may occur.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Although the components of this product are not sensitive to static discharge, dusts of organic compounds, such as this material, can be ignited by static discharge especially if large amounts of dusts accumulate. All equipment used in the handling of this material should be electrically grounded.

SPECIAL FIRE-FIGHTING PROCEDURES: Move containers from fire area if it can be done without risk to personnel. Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Chemical resistant clothing may be necessary. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.



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

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: For small releases take basic hygiene precautions. Lightweight gloves and eye protection should be worn if dusts may be generated during the cleanup process. Sweep up, vacuum, or wipe up spilled material with damp sponge or polypad. Trained personnel using pre-planned procedures should respond to large releases that are not immediately controlled. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel. In the event of a non-incident release, minimum Personal Protective Equipment should be the following: **dust mask, gloves, eye protection, and suitable body protection.** Eliminate all sources of ignition before clean-up operations begin. Use non-sparking tools. Sweep up or vacuum spilled solid (an explosion-proof vacuum should be used). Disinfect area with 0.5% hypochlorite solution (a freshly prepared 1:10 dilution of Chlorox). Decontaminate the area thoroughly. Place all spill residue in a double plastic bag or other containment 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). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.

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

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting the components of this product ON YOU or IN YOU. Wash thoroughly after handling the components of this product. Avoid generating airborne dusts of the components of this product. Do not eat or drink while handling the components of this product. Sweep up, vacuum, or wipe down use areas often to avoid accumulation of dusts in the workplace. It is prudent practice to regard the components of this product as potentially infectious materials and to handle them in accordance with Universal Precautions and the OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030). Follow SPECIFIC USE INSTRUCTIONS supplied with this product.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Open containers slowly on a stable surface. Keep containers tightly closed when not in use. Empty containers may contain residual amounts of the components of this product; therefore, empty containers should be handled with care. Store away from incompatible materials (see Section 10, Stability and Reactivity). Store the components of this product in original containers refrigerated at 2–8°C (35–46°F). Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

SPECIFIC USE(S): This product is for use in medical diagnostic procedures. Follow all industry standards for use of this product.

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, as applicable. Collect all rinsates and dispose of according to applicable Federal, State, and local procedures standards. All disposable items contaminated with the components of this product should be disposed of properly.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in this section, if applicable. Ensure eyewash/safety shower stations are available near areas where this product is used. If necessary, refer to Australian National Code of Practice for the Control of Workplace Hazardous Substances [NOHSC: 2007 (1994)] for further information, or regulations of the country product is used in.

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: Currently, there are international exposure limits for components of this product as follows. These limits may not be the most current; consult appropriate authority in your country for information on any new limits.

SODIUM CHLORIDE:

Russia: STEL = 5 mg/m³, JUN 2003

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS/GUIDELINES:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		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
This product is composed of a variety of materials as described below. It is recommended that the following exposure limits for "Particulates Not Otherwise Classified" (PNOC) be used to address occupational exposures to this mixture.		NE	NE	50 mppcf or 15 (Total Dust) 15 mppcf or 5 (Respirable Fraction)	NE	NE	NE	NE	DFG MAK: TWA = 4 (Inhalable fraction) 1.5 (Respirable fraction)
Blood Extracts	68070-90-6	NE	NE	NE	NE	NE	NE	NE	NE
D-Lactose Monohydrate	10039-26-6	NE	NE	NE	NE	NE	NE	NE	NE
Cholesterol	57-88-5	NE	NE	NE	NE	NE	NE	NE	NE
Glucose	50-99-7	NE	NE	NE	NE	NE	NE	NE	NE
4-(2-Hydroxyethyl) piperazine-1-ethanesulfonic Acid	7365-45-9	NE	NE	NE	NE	NE	NE	NE	NE
Sodium Acetate Trihydrate	6131-90-4	NE	NE	NE	NE	NE	NE	NE	NE
Sodium Chloride	7647-14-5	NE	NE	NE	NE	NE	NE	NE	NE

NE = Not Established

See Section 16 for Definitions of Terms Used

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with regulations found in U.S. OSHA 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, or Singapore 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).

EYE PROTECTION: For operations in which airborne dusts of the components of this product may be generated, wear splash goggles or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian CSA Standard Z94.3-02, European Standard CR 13464:1999 or the Australian Standard 1337-Eye Protection for Industrial Applications and Australian Standard 1336-Recommended Practices for Eye Protection in the Industrial Environment.

HAND PROTECTION: Wear lightweight gloves for routine industrial use. 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 or the Australian Standard 2161-Industrial Safety Gloves and Mittens, or the European Standard CEN/TR 15419:2006.

BODY PROTECTION: Use body protection appropriate for task (e.g., light-weight cotton gown or other medical attire is recommended). If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) appropriate Standards of Canada, appropriate Standards of Canada, the European Standard CEN/TR 15419:2006 or Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals.

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

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Not established.

DENSITY @ 20°C: Not established.

VAPOR PRESSURE, mmHg: Not established.

ODOR THRESHOLD: Odorless.

SHOCK SENSITIVITY: Not applicable.

FLASH POINT: Not applicable.

LOG WATER/OIL DISTRIBUTION COEFFICIENT: Not available.

APPEARANCE, ODOR and COLOR: Slightly yellow, odorless, lyophilized powders.

HOW TO DETECT THIS SUBSTANCE: The appearance may act as an identifying property for components of this product in event of a accidental release.

EVAPORATION RATE (nBuAc = 1): Not established.

FREEZING/MELTING POINT: Not established.

pH: Not applicable.

OXIDIZING PROPERTIES: Not applicable.

VISCOSITY: Not determined.

FLAMMABILITY LIMITS: Not applicable.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal decomposition of the components of this product may product carbon oxides, nitrogen oxides, sulfur oxides, sodium chloride, and hydrogen chloride.

10. STABILITY and REACTIVITY (Continued)

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, strong oxidizers.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Incompatible chemicals, extreme temperatures.

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

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: No adverse health effects should occur from routine, occupational use of the components of this product in the manner specified by the manufacturer's instructions. The potential health effects of the components of this product are described as follows:

INHALATION: Inhalation of airborne dusts of the components of this product may mildly irritate the nose, throat, and lungs. Symptoms of such overexposure may include sneezing, coughing, and nasal congestion. Symptoms are generally alleviated upon breathing fresh air.

CONTACT WITH SKIN or EYES: Dusts from the components of this product may irritate contaminated skin (especially in the event of prolonged overexposures). Symptoms of skin overexposure may include redness and itching. Repeated skin contact may cause dermatitis (dry, red skin). Dusts from the components of this product can irritate the eyes (i.e., foreign object). Symptoms of eye overexposure can include redness and tearing. Prolonged or severe eye exposure may cause increased irritation.

SKIN ABSORPTION: The components of this product are not known to be absorbed through intact skin.

INGESTION: Ingestion is not anticipated to be a significant route of exposure for the components of this product. Acute ingestion of large quantities of the components of this product caused by poor hygiene practices may cause nausea, vomiting, and diarrhea.

INJECTION: Though not anticipated to be a significant route of exposure, injection of the components of this product can cause reddening and local swelling. The source materials in the components of this product have been

tested for human immunodeficiency virus (HIV1, HIV2) antibody, hepatitis B surface antigen (HBsAg), and hepatitis C (HCV) antibody and found to be non-reactive. However, no known test method can offer complete assurance that products derived from human blood will not transmit infectious agents. It is prudent practice to regard the components of this product as potentially infectious materials and to handle them in accordance with Universal Precautions and the U.S. OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030).

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

Acute: The chief health hazard associated with exposure to this product during occupational use is the potential for irritation of contaminated skin, eyes, nose, and upper respiratory tract. Adverse symptoms after ingestion of large quantities of the product may include nausea, vomiting, and diarrhea.

Chronic: Repeated skin overexposure may cause dermatitis (dry, red skin).

Target Organs: ACUTE: Eyes, skin. CHRONIC: Skin.

TOXICITY DATA: The following information is available for the components of this product present in greater than 1% concentration.

BLOOD EXTRACTS:

Currently, there are no toxicological data available for this compound.

CHOLESTEROL:

TDLo (Oral-Rat) 14,700 mg/kg/14 weeks-continuous: Skin and Appendages: tumors; Tumorigenic: protects against induction of experimental tumors, active as anti-cancer agent

TDLo (Oral-Rabbit) 2100 mg/kg/12 weeks-continuous: Peripheral Nerve and Sensation: recording from peripheral motor nerve; Sense Organs and Special Senses (Ear): changes in cochlear structure or function; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol)

TDLo (Oral-Rabbit) 12,180 mg/kg/40 weeks-continuous: Liver: changes in liver weight; Endocrine: changes in spleen weight; Blood: pigmented or nucleated red blood cells

CHOLESTEROL (continued):

TDLo (Oral-Rabbit) 17.85 gm/kg/17 weeks-intermittent: Vascular: other changes; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Metabolism (Intermediary): lipids including transport

TDLo (Oral-Rabbit) 100.6 gm/kg/61 days-continuous: Liver: change in gall bladder structure or function; Biochemical: Metabolism (Intermediary): lipids including transport

TDLo (Oral-Rabbit) 6 gm/kg: female 1-31 day(s) after conception: Reproductive: Effects on Embryo or Fetus: extra-embryonic structures (e.g., placenta, umbilical cord); Effects on Newborn: stillbirth

TDLo (Oral-Hamster) 62.5 gm/kg/3 weeks-intermittent: Liver: multiple effects; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Metabolism (Intermediary): lipids including transport

TDLo (Intraperitoneal-Rat) 800 mg/kg/43 weeks-intermittent: Tumorigenic: equivocal tumorigenic agent by RTECS criteria, tumors at site of application

CHOLESTEROL (continued):



TDLo (Subcutaneous-Rat) 175 mg/kg: female 8-14 day(s) after conception: Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue)

TDLo (Subcutaneous-Rat) 1900 mg/kg: female 1-19 day(s) after conception: Reproductive: Fertility: 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)

TDLo (Subcutaneous-Mouse) 15 gm/kg/47 weeks-intermittent: Tumorigenic: carcinogenic by RTECS criteria, tumors at site of application

TDLo (Subcutaneous-Mouse) 60 gm/kg/2 weeks-intermittent: Tumorigenic: carcinogenic by RTECS criteria, tumors at site of application

TDLo (Implant-Mouse) 800 mg/kg: Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Kidney/Ureter/Bladder: tumors; Tumorigenic: tumors at site of application

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD		(BLUE)	1
FLAMMABILITY HAZARD		(RED)	1
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

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

CHOLESTEROL (continued):

Mutation in Microorganisms (Bacteria-*Salmonella typhimurium*) 500 µg/plate

DNA Adduct (Mouse Cells-Not Otherwise Specified) 1 µmol/L

GLUCOSE:

TDLo (oral, woman) = 2 g/kg/female 28 weeks after conception; Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue), other developmental abnormalities

TDLo (intravenous, woman) = 2 g/kg/female 39 weeks after conception; Reproductive: Maternal Effects: other effects; Reproductive: Effects on Embryo or Fetus: other effects to embryo

TDLo (intravenous, woman) = 1057 µg/kg/female 39 weeks after conception; Reproductive: Specific Developmental Abnormalities: hepatobiliary system

TDLo (intravenous, woman) = 1300 mg/kg/female 39 weeks after conception; Reproductive: Effects on Newborn: biochemical and metabolic, behavioral

LD₅₀ (oral, rat) = 25,800 mg/kg; Behavioral: coma; Lungs, Thorax, or Respiration: cyanosis; Gastrointestinal: hypermotility, diarrhea

LD₅₀ (intraperitoneal, mouse) = 18 g/kg

LD₅₀ (intravenous, mouse) = 9 g/kg

LDLo (oral, dog) = 8 g/kg

LDLo (oral, rabbit) = 20 g/kg

LDLo (intravenous, rabbit) = 12 g/kg

TDLo (subcutaneous, rat) = 15,400 gm/kg/22 weeks/continuous; Tumorigenic: equivocal tumorigenic agent by RTECS criteria, tumors at site of application

TDLo (intraperitoneal, rat) = 300 g/kg/female 30 days pre-mating; Reproductive: Maternal Effects: ovaries, fallopian tubes, uterus, cervix, vagina

TDLo (intraperitoneal, hamster) = 20 g/kg/female 6–8 days after conception; Reproductive: Specific Developmental Abnormalities: eye/ear

TDLo (subcutaneous, hamster) = 20 g/kg/female 6–8 days after conception; Reproductive: Specific Developmental Abnormalities: eye/ear

Mutation in Microorganisms (bacteria, *Salmonella typhimurium*) = 25 mg/plate

GLUCOSE (continued):

Mutation Test Systems (microorganism) = 1 mol/L

DNA Damage (microorganism) = 150 mmol/L

DNA Damage (human cells) = 30 mmol/L

DNA Damage (human cells) = 225 mmol/L/5 days

DNA Damage (human cells) = 315 mmol/L/7 days

Mutation in Mammalian Somatic Cells (lymphocyte, mouse) = 179 mmol/L

D-LACTOSE MONOHYDRATE:

Currently, there are no toxicological data available for this compound.

4-(2-HYDROXYETHYL)PIPERAZINE-1-ETHANESULFONIC ACID

LD₅₀ (Oral-Rat) > 316 mg/kg

SODIUM ACETATE TRIHYDRATE:

Currently, there are no toxicological data available for this compound.

SODIUM CHLORIDE:

TDLo (intraplacental, woman) = 27 mg/kg/15 weeks pregnant; Reproductive effects

TDLo (oral, human) = 12,357 mg/kg/23 days/continuous; Cardiovascular effects

DNA Inhibition (fibroblast, human) = 125 mmol/L

LD₅₀ (oral, rat) = 3000 mg/kg

LC₅₀ (inhalation, rat) > 42 g/m³/1 hour

LDLo (subcutaneous, rat) = 3500 mg/kg

LD₅₀ (oral, mouse) = 4000 mg/kg

LD₅₀ (intraperitoneal, mouse) = 6614 mg/kg

LD₅₀ (subcutaneous, mouse) = 3 g/kg

LD₅₀ (intravenous, mouse) = 645 mg/kg

LD₅₀ (intracervical, mouse) = 131 mg/kg

LDLo (intraperitoneal, dog) = 364 mg/kg

LDLo (intravenous, dog) = 2 g/kg

LDLo (oral, rabbit) = 8 g/kg

LDLo (skin, rabbit) > 10 g/kg

LDLo (intravenous, rabbit) = 1100 mg/kg

LDLo (subcutaneous, guinea pig) = 2160 mg/kg

LDLo (intravenous, guinea pig) = 2910 mg/kg

LDLo (parenteral, guinea pig) = 300 mg/kg

LDLo (intraarterial, guinea pig) = 300 mg/kg

SODIUM CHLORIDE (continued):

TDLo (oral, rat) = 145 g/kg/female 7 days pre-mating/female 1–22 days after conception; Reproductive: Effects on Newborn: delayed effects

TDLo (oral, rat) = 56400 mg/kg/female 5 days pre-mating/21 days post-birth; Reproductive: Maternal Effects: postpartum, Effects on Newborn: biochemical and metabolic

TDLo (oral, rat) = 16800 mg/kg/28 days/continuous; Endocrine: changes in adrenal weight

TDLo (intraperitoneal, rat) = 1710 mg/kg/female 13days post; Teratogenic effects

TDLo (parenteral, rat) = 10 mg/kg/female 1 day pre-mating; Reproductive: Maternal Effects: ovaries, fallopian tubes

TDLo (intrauterine, rat) = 500 mg/kg/female 4 days after conception; Reproductive: Fertility: pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea)

TDLo (subcutaneous, mouse) = 1900 mg/kg/female 10–11 days after conception; Reproductive: Effects on Embryo or Fetus: fetal death, Specific Developmental Abnormalities: musculoskeletal system

TDLo (subcutaneous, mouse) = 2500 mg/kg/female 10 days after conception; Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus)

Skin Irritancy (rabbit) = 50 mg/24 hours; mild

Skin Irritancy (rabbit) = 500 mg/24 hours; mild

Eye Irritancy (rabbit) = 100 mg; mild

Eye Irritancy (rabbit) = 100 mg/24 hours; moderate

Eye Irritancy (rabbit) = 10 mg; moderate

Mutation in Microorganisms (yeast, *Saccharomyces cerevisiae*) = 2 mol/L

Unscheduled DNA Synthesis (oral, rat) = 16800 mg/kg/4 weeks/continuous

Cytogenetic Analysis (intraperitoneal, rat) = 2338 mg/kg

DNA Damage (lymphocyte, mouse) = 101 mmol/L

Mutation in Mammalian Somatic Cells (lymphocyte, mouse) = 57200 µmol/L

Micronucleus Test (lung, hamster) = 4 g/L

DNA Damage (ovary, hamster) = 275 mmol/L

Cytogenetic Analysis (ovary, hamster) = 160 mmol/L

Cytogenetic Analysis (lung, hamster) = 7500 mg/L

CARCINOGENIC INFORMATION: The Cholesterol constituent in components of this product is listed by agencies tracking the carcinogenic potential of chemical compounds as follows:

IARC-3: (Unclassifiable as to carcinogenicity in Humans)

The other components of this product are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, or ACGIH and therefore are neither considered to be nor suspected to be cancer causing agents by these agencies.

IRRITANCY OF PRODUCT: Contact with the skin or eyes may cause mild irritation.

SENSITIZATION TO THE PRODUCT: The components of this product are not known to be sensitizers with prolonged or repeated use.

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

Mutagenicity: The components of this product are not reported to cause human mutagenic effects.

Embryotoxicity: The components of this product are not reported to cause human embryotoxic effects.

Teratogenicity: The components of this product are not reported to cause human teratogenic effects.

Reproductive Toxicity: The components of this product are not reported to cause human reproductive effects.

A **mutagen** is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generation 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.

BIOLOGICAL EXPOSURE INDICES: Currently, there are no Biological Exposure Indices (BEIs) determined for the components of this product.

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 mobility information is available for some constituents of the components of this product.

CHOLESTEROL:

The Koc of Cholesterol is estimated as 16,000, using a water solubility of 0.095 mg/L and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that cholesterol is expected to be immobile in soil.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. It is expected that some biodegradation will occur to this product; however, no specific information is known.

12. ECOLOGICAL INFORMATION (Continued)

PERSISTENCE AND BIODEGRADABILITY (continued): The following data are available for some constituents of the components of this product.

CHOLESTEROL:

Based on a classification scheme, an estimated Koc value of 16,000, determined from a water solubility of 0.095 mg/L and a regression-derived equation, indicates that Cholesterol is expected to be immobile in soil. Volatilization of Cholesterol from moist soil surfaces is expected to be an important fate process given an estimated Henry's Law constant of 1.7×10^{-4} atm-cu m/mole, using a fragment constant estimation method. However, volatilization from moist soil surfaces is expected to be attenuated by adsorption. Cholesterol is not expected to volatilize from dry soil surfaces based upon an estimated vapor pressure of 7.8×10^{-10} mm, determined from a fragment constant method. An estimated Koc value of 16,000, determined from a water solubility of 0.095 mg/L and a regression-derived equation, indicates that cholesterol is expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is expected based upon an estimated Henry's Law constant of 1.7×10^{-4} atm-cu m/mole, developed using a fragment constant estimation method. Using this Henry's Law constant and an estimation method, volatilization half-lives for a model river and model lake are 8.9 hours and 11 days, respectively. However, volatilization from water surfaces is expected to be attenuated by adsorption to suspended solids and sediment. The estimated volatilization half-life from a model pond is 145 years if adsorption is considered. According to a model of gas/particle partitioning of semi-volatile organic compounds in the atmosphere, Cholesterol, which has an estimated vapor pressure of 7.8×10^{-10} mm Hg at 25°C, determined from a fragment constant method, is expected to exist solely in the particulate phase in the ambient atmosphere. Particulate-phase cholesterol may be removed from the air by wet and dry deposition.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential. The following information is available for some constituents in the components of this product.

CHOLESTEROL:

An estimated BCF of 270 was calculated for Cholesterol, using an estimated log Kow of 8.7 and a regression-derived equation. According to a classification scheme, this BCF suggests the potential for bioconcentration in aquatic organisms is high.

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All release to terrestrial, atmospheric and aquatic environments should be avoided. The following aquatic toxicity data are available for some constituents in the components of this product.

SODIUM CHLORIDE:

LC₅₀ (*Carassius auratus* goldfish) 240 hours = 11,764.3 mg/L (@ 23.5°C, tap water, static bioassay)
LC₅₀ (*Tinca tinca* tench) 12 hours = 112 mg/L @ 25°C, freshwater, static bioassay
LC₅₀ (*Tinca tinca* tench) 12 hours = 1142 mg/L @ 20°C, freshwater, static bioassay
LC₅₀ (*Tinca tinca* tench) 24 hours = 119 mg/L @ 25°C, freshwater, static bioassay
LC₅₀ (*Tinca tinca* tench) 24 hours = 104 mg/L @ 20°C, freshwater, static bioassay
EC₅₀ (*Daphnia magna* water flea) 48 hours = 340.7-469.2 mg/L s.c. (11.5-14.5°C, well water, static bioassay)

OTHER ADVERSE EFFECTS: This product does not contain any component with ozone depletion potential.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. 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. Shipment of wastes must be done with appropriately permitted and registered transporters.

DISPOSAL CONTAINERS: Waste materials must be placed in and shipped in appropriate 5-gallon or 55 gallon poly or metal waste pails or drums. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to all applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials. Dispose of in accordance with applicable Federal, State, and local procedures and standards

U.S. EPA WASTE NUMBER: Not applicable.

EUROPEAN WASTE CODES: Wastes from Human or Animal Health Care or Related Research: 18 01 08: Medicines Other Than Those Mentioned in 18 01 07.

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

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

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is not classified as dangerous goods, per the International Air Transport Association.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is not classified as dangerous goods, per the International Maritime Organization.

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.

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.

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are not subject to Sections 302, 304, and 313 reporting requirements under the Superfund Amendment and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

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

15. REGULATORY INFORMATION (Continued)

ADDITIONAL UNITED STATES REGULATIONS (continued):

U.S. TSCA INVENTORY STATUS: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

OTHER U.S. FEDERAL REGULATIONS: The requirements of the OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030) may be applicable, based on the use of this product.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is on the California Proposition 65 lists.

U.S. ANSI STANDARD LABELING (Z129.1): **CAUTION!** MAY CAUSE RESPIRATORY TRACT, SKIN, AND EYE IRRITATION. Do not taste or swallow. Avoid skin and eye contact. Avoid contact with clothing. Avoid prolonged or repeated skin contact. Avoid breathing dusts. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, dust mask, and appropriate body protection during operations that can generate dust. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention if necessary. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with polypads and place in suitable container. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL STATUS: The components of this product are listed on the DSL Inventory or are exempt.

CANADIAN WHMIS IDL DISCLOSURE STATUS: The components of this product do not have disclosure requirement levels.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION AGENCY (CEPA) PRIORITY SUBSTANCES LISTS: No component of this product is on the Priority Substances List.

WHMIS CLASSIFICATION AND SYMBOLS: Not applicable.

ADDITIONAL EUROPEAN UNION REGULATIONS:

EU LABELING/CLASSIFICATION: This product does not meet the definition of any hazard class as defined by the European Union Council Directive 67/548/EEC and subsequent Directives.

EU Classification: Not applicable.

EU Risk Phrases: Not applicable.

EU Safety Phrases: Not applicable.

European Union Annex II Hazard Symbol: Not applicable.

ADDITIONAL AUSTRALIAN REGULATIONS:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: The components of this product are listed on the AICS or are excepted as hydrates of listed compounds or as biological materials. Any chemical not included in AICS is regarded as a new industrial chemical unless it is outside the scope of the Industrial Chemicals (Notification and Assessment) Act 1989 OR is otherwise exempt from notification. New industrial chemicals must be notified and assessed before being manufactured or imported into Australia.

HAZARDOUS SUBSTANCES INFORMATION SYSTEM (HSIS): No component of this product is listed in the HSIS.

AUSTRALIAN LABELING/CLASSIFICATION: This product does not meet the definition of any hazard class as defined by the Australian National Occupational Health and Safety Commission [NOHSC(1008:2004)].

Classification: Not applicable.

Risk Phrases: Not applicable.

Safety Phrases: Not applicable.

Hazard Symbol: Not applicable.

POISONS SCHEDULE NUMBER: Not applicable.

ADDITIONAL LABELING: Not applicable.

16. OTHER INFORMATION

PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
800/441-3365

DEFINITIONS 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.

EXPOSURE LIMITS IN AIR (continued):

DFG MAK Germ Cell Mutagen Categories (continued): **3A:** Substances which have been shown to induce genetic damage in germ cells of human or 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.

DEFINITIONS OF TERMS (Continued)

EXPOSURE LIMITS IN AIR (continued):

DFG MAK Germ Cell Mutagen Categories (continued): 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. **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.

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 LD₅₀Rat 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 LD₅₀Rat 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 LD₅₀Rat 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 LD₅₀Rat 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 LD₅₀Rat or Rabbit < 20 mg/kg. Inhalation Toxicity LC₅₀ 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 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 IIIB, 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 coarse 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.); **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 is 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. *Unstable 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.

DEFINITIONS OF TERMS

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

3 (continued): 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. 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. Oxidizers: 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.; **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. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids).

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 1 (continued): 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 up 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.

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.

DEFINITIONS OF TERMS

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: ACGIH: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. This section explains the impact of various laws and regulations on the material. EPA is the U.S. Environmental Protection Agency. 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/NDL); 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.