VITEC® 4000 NSF
MATERIAL SAFETY DATA SHEET

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):	**VITEC® 4000**
CHEMICAL NAME/CLASS:	Not Applicable
SYNONYMS:	Organic Acid, Terpolymer
PRODUCT USE:	Antiscalant/Antifoulant
SUPPLIER/MANUFACTURER'S NAME:	**AVISTA TECHNOLOGIES**
ADDRESS:	140 Bosstick Blvd San Marcos, CA 92069
CHEMTREC EMERGENCY NO.:	1-800-424-9300 (United States)** 1-703-527-3887 (International)
BUSINESS PHONE:	(760) 744-0536
DATE OF PREPARATION:	May 13, 1999, Revised August 2012

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL			
			TWA mg/m^3	STEL mg/m^3	TWA mg/m^3	STEL mg/m^3	IDLH mg/m^3	OTHER mg/m^3
Acrylic Polymer		10–20	NE	NE	NE	NE	NE	NE
bis-phosphonic Acid	Proprietary	1-10	NE	NE	NE	NE	NE	NE
Inorganic Acid	Proprietary	< 0.1	1	3	1	3 (vacated 1989 PEL)	1000	NIOSH REL: TWA = 1 STEL = 3
Aromatic Carboxylic Acid Salt	Proprietary	< 1	NE	NE	NE	NE	NE	NE
Water and Sodium Hydroxide. Sodium Hydroxide is added for pH adjustment only and does not contribute any additional hazards to this product.		Balance	NE	NE	NE	NE	NE	NE

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

NOTE: All WHMIS information is included; it is located in appropriate sections based on the ANSI Z400.1-1998 format.

NSF Certified to NSF/ANSI 60

DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO ANSI/NSF 60 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE IN REVERSE OSMOSIS SYSTEMS AT A MAXIMUM LEVEL OF 7 mg/l

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a clear, amber liquid with a mild odor. This product may slightly irritate contaminated tissue. This product is neither reactive nor flammable. Emergency responders must wear personal protective equipment (and have appropriate fire-extinguishing protection) suitable for the situation to which the are responding.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: 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:

INHALATION: Inhalation of mists or sprays of this product may irritate the nose, throat, or other tissues of the respiratory system. Symptoms of such exposure may include tingling, coughing, sneezing, and difficulty breathing.

CONTACT WITH SKIN or EYES: Depending on the duration and concentration of overexposure, eye or skin contact may cause slight irritation. Symptoms of skin contact may include redness and irritation. Prolonged or repeated overexposure to this product may cause dermatitis (dry, red skin). Repeated overexposure to this product may cause sensitization; subsequent exposures to very small amounts may cause allergic reaction. Symptoms may include tingling, redness, and rapid development of eczema. Symptoms of eye contact may include irritation, tingling, and tearing.

SKIN ABSORPTION: Skin absorption is not a significant route of exposure for any component of this product.

INGESTION: Ingestion is not anticipated to be a likely route of exposure to this product. If this product is swallowed, it may cause gastric discomfort. Symptoms may include stomach pains, cramps, and gastritis.

INJECTION: Accidental injection of this product can cause burning, reddening, and swelling in addition to the wound.

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

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		C

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		

For routine industrial applications

See Section 16 for Definition of Ratings

ACUTE: Inhalation exposure may cause tingling, coughing, sneezing, and difficulty breathing. Symptoms of skin and eye contact may include redness and irritation. Ingestion may cause stomach pains, cramps, and gastritis.

CHRONIC: Prolonged or repeated skin overexposure to this product may cause dermatitis (dry, red skin). Repeated skin overexposure may cause sensitization. Symptoms may include tingling, redness, and rapid development of eczema.

TARGET ORGANS: Acute: Skin, eyes. Chronic: Skin.

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

4. FIRST-AID MEASURES

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim should seek immediate medical attention if any adverse exposure symptoms develop.

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 15 minutes. Victim must seek medical attention.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

4. FIRST-AID MEASURES (Continued)

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING. Have victim rinse mouth with water, if conscious. Never induce vomiting or give a diluent (e.g., water) to someone who is unconscious, having convulsions, or unable to swallow. If contaminated individual is convulsing, maintain an open airway and obtain immediate medical attention.

Victims of chemical exposure must be taken for medical attention if any adverse effects occur. Rescuers should be taken for medical attention if necessary. Take a copy of label and MSDS to physician or health professional with victim.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting dermatitis, other skin conditions, and respiratory conditions may be aggravated by exposures to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.
AUTOIGNITION TEMPERATURE: Not applicable.
FLAMMABLE LIMITS (in air by volume, %):

Lower: Not applicable.
Upper: Not applicable.

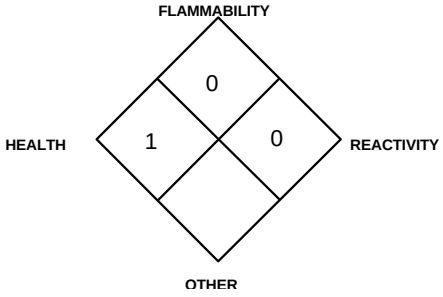
FIRE EXTINGUISHING MATERIALS: This material will not contribute to the intensity of a fire. Use extinguishing material suitable to the surrounding fire.

Water Spray: YES Carbon Dioxide: YES
Foam: YES Dry Chemical: YES
Halon: YES Other: Any "ABC" Class

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may decompose and produce irritating fumes and toxic gases (e.g., carbon monoxide, carbon dioxide, and phosphorus and sodium oxides).

Explosion Sensitivity to Mechanical Impact: Not applicable.
Explosion Sensitivity to Static Discharge: Not applicable.

NFPA RATING



See Section 16 for Definition of Ratings

SPECIAL FIRE-FIGHTING PROCEDURES: 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

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people. Releases of this material may be slippery.

In the event of an incidental release of this product, personnel should wear gloves and safety glasses (or goggles). In the event of a non-incidental release, Minimum Personal Protective Equipment should be **Level D: lab-gloves, chemical resistant apron, boots, and splash goggles. Respiratory protection should not be necessary. Level B, which includes the use of Self-Contained Breathing Apparatus, should be worn when oxygen levels are below 19.5% or are unknown.** Absorb spilled liquid with polypads or other suitable absorbent materials. Decontaminate the area thoroughly. Prevent spill rinsate from contamination of storm drains, sewers, soil or groundwater. Place all spill residue in a suitable container and seal. Dispose of in accordance with applicable U.S. Federal, State, or local procedures or appropriate standards of Canada (see Section 13, Disposal Considerations).

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 this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat or drink while handling this material. Avoid generating mists and sprays of this product. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Open containers carefully on a stable surface. Empty containers may contain residual liquid; therefore, empty containers should be handled with care.

7. HANDLING and STORAGE (Continued)

STORAGE AND HANDLING PRACTICES (continued): Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers, or in a diked area, as appropriate. Storage and use areas should be covered with impervious materials. Storage areas should be made of fire-resistant materials. Keep container tightly closed when not in use. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures or appropriate Canadian standards.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: None needed under normal conditions of use. Use NIOSH approved respirators if ventilation is inadequate to control mists. Maintain airborne contaminate concentrations below guidelines listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. 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: Use approved safety goggles or safety glasses, as described in OSHA 29 CFR 1910.133. Splash goggles with a faceshield may be needed if splash hazards exist.

HAND PROTECTION: Wear chemical impervious gloves (e.g., rubber, Neoprene).

BODY PROTECTION: Use body protection appropriate for task (e.g., Tyvek suit, rubber apron) to protect from splashes and sprays.

HMIS PERSONAL PROTECTIVE EQUIPMENT RATING: C

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Similar to water.
SPECIFIC GRAVITY: 1.1 – 1.2
SOLUBILITY IN WATER: Soluble.
VAPOR PRESSURE, mm Hg @ 20°C: 18
EVAPORATION RATE (water = 1): Approximately 1.
MELTING/FREEZING POINT: Approximately 0°C
BOILING POINT: Approximately 100°C
pH: 4.5 – 6.5
ODOR THRESHOLD: Not available.
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.
APPEARANCE AND COLOR: This product is a clear, amber liquid with a mild odor.
HOW TO DETECT THIS SUBSTANCE (warning properties): The color and odor may act as warning properties associated with this product.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal decomposition of this product may generate carbon monoxide, carbon dioxide, phosphorus and sodium oxides.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong bases, oxidizers, water reactive materials.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid contact with incompatible chemicals.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology information is available for components greater than 1 % in concentration.

ACRYLIC POLYMER:

LD_{50} (oral, rat) > 5000 mg/kg

LD_{50} (dermal, rabbit) > 2000 mg/kg

Eye irritation-rabbit: inconsequential irritation

Skin irritation-rabbit: practically non-irritating

1-(HYDROXETHYLIDENE)-BIS-PHOSPHONIC ACID:

TDLo (intraperitoneal, mouse) = 200 mg/kg/female 7 days post; Teratogenic effects

TDLo (intraperitoneal, mouse) = 40 mg/kg/female 7 days post; Reproductive effects

1-(HYDROXETHYLIDENE)-BIS-PHOSPHONIC ACID (continued):

TDLo (subcutaneous, mouse) = 200 mg/kg/female 13 days after conception; Reproductive: Specific Developmental Abnormalities: musculoskeletal system

TDLo (subcutaneous, mouse) = 1400 mg/kg/female 11–17 days after conception; Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus), Specific Developmental Abnormalities: musculoskeletal system

LD_{50} (oral, mouse) = 1800 mg/kg

SUSPECTED CANCER AGENT: The other components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA, and therefore are neither considered to be nor suspected to be cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: This product can be irritating to contaminated tissue.

SENSITIZATION TO THE PRODUCT: This product may cause sensitization; subsequent exposures to very small amounts may cause allergic reaction.

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

Mutagenicity: This product is not reported to produce mutagenic effects in humans. Animal mutation data are available for the Aromatic Carboxylic Acid Salt component of this product; these data were obtained during clinical studies on specific animal tissues exposed to high doses of this compound.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.

Teratogenicity: This product is not reported to cause teratogenic effects in humans. Clinical studies on test animals exposed to relatively high doses of the Aromatic Carboxylic Acid Salt component of this product provided teratogenic data.

Reproductive Toxicity: This product is not reported to cause reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of the Aromatic Carboxylic Acid Salt component of this product provided reproductive toxicity data.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which 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 which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURES INDICES (BEIs): Currently, there are no Biological Exposure Indices (BEIs) for any component of this product.

12a. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product will decompose into other organic and inorganic compounds over time under normal environmental conditions. Additional environmental data for components are as follows:

INORGANIC ACID:

Food Chain Concentration Potential: Very Low

Chronic Hazard Level: The abundance of phosphates threatens algal blooms in fresh and some salt waters

Waterfowl toxicity: No data available

Biological Oxygen Demand (BOD): None

Water solubility: 548 g/ 100 cc (cold).

Persistence: If released to bodies of water, while acidity may be reduced readily by natural water hardness minerals, the phosphate may persist indefinitely. If released to soil, the acid will be neutralized to some degree with adsorption of the proton and phosphate ions also possible. However, significant amounts of acid will remain for transport down toward the groundwater table.

Mobility\Soil Adsorption: When spilled onto soil, this acid will infiltrate downward, the rate being greater with lower concentration because of reduced viscosity. During transport through the soil, this acid will dissolve some of the soil material, in particular, carbonate-based materials. This acid will be partially neutralized; however, some will remain to leach to groundwater. Upon reaching the groundwater table, the acid will continue to move in the direction of groundwater flow. A contaminated plume will be produced with dilution and dispersion serving to reduce the acid concentration.

12a. ECOLOGICAL INFORMATION (Continued)

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product may be harmful to animal life if large volumes of it are released into the environment. Refer to section 11 (Toxicological Information) for information on the effects of components of this product on test animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product may be harmful to contaminated aquatic life (especially if large volumes of it are released into an aquatic environment. Additional aquatic toxicity data are available as follows:

ACRYLIC POLYMER:
EC_{50} (algae) = 72.4 mg/L/ 72 hours
EC_{50} (*Daphnia magna*) > 1040 mg/L/ 48 hours
LC_{50} (*Salmo gairdneri*) > 1100 mg/L/ 96 hours

1-(HYDROXETHYLIDENE)-BIS-PHOSPHONIC ACID:
NOEC (rainbow trout) 96 hours = 180 mg/L
NOEC (*Daphnia magna* water flea) 48 hours = 125 mg/L
NOEC (*Selenastrum* algae) 96 hours = 5.2 mg/L

1-(HYDROXETHYLIDENE)-BIS-PHOSPHONIC ACID (continued):
EC_{50} (*Daphnia magna* water flea) 48 hours = 242 mg/L
EC_{50} (*Selenastrum* algae) 96 hours = 1.9 mg/L

INORGANIC ACID:
TLm (immersion, mosquito fish) = 138 ppm/ 24-96 hours/ turbid water
Chronic Hazard Level: The abundance of phosphates threatens algal blooms in fresh and some salt waters

12b. AQUATIC TOXICITY INFORMATION

Ceriodaphnia 48-hour renewal bioassay;
No mortality was observed at the highest concentration tested:
0% mortality at 1000 mg/L

Fathead minnow 96-hour renewal bioassay.
No mortality was observed at the highest concentration tested:
0% mortality at 1000 mg/L

Daphnia 48-hour static renewal bioassay: No mortality observed at the highest concentration tested: 0% mortality at 1000 mg/L.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada. This product, if unaltered by the handling, may be disposed of by treatment at a permitted facility or as advised by your local waste regulatory authority.

EPA WASTE NUMBER: Not applicable to wastes consisting only of this product.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Not applicable.
HAZARD CLASS NUMBER and DESCRIPTION: Not applicable.
UN IDENTIFICATION NUMBER: Not applicable.
DOT LABEL(S) REQUIRED: Not applicable.
PACKAGING GROUP: Not applicable.
NORTH AMERICAN RESPONSE GUIDEBOOK NUMBER (1996): Not applicable.
NATIONAL MOTOR FREIGHT CLASSIFICATION: # 70

MARINE POLLUTANT: No component of this product is listed as a marine pollutant by the D.O.T. (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS NOT CONSIDERED AS DANGEROUS GOODS.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

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

COMPONENT	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Inorganic Acid	No	No	Yes

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs (4,540 kg) therefore applies, per 40 CFR 370.20. U.S. CERCLA REPORTABLE QUANTITY (RQ): Inorganic Acid = 5000 lb (2268 kg).

15. REGULATORY INFORMATION (Continued)

U.S. TSCA INVENTORY STATUS: The chemicals in this product that are listed by CAS # are listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

U.S. STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Inorganic Acid.
California - Permissible Exposure Limits for Chemical Contaminants: Inorganic Acid.
Florida - Substance List: Inorganic Acid.
Illinois - Toxic Substance List: Inorganic Acid.
Kansas - Section 302/313 List: Inorganic Acid.
Massachusetts - Substance List: Inorganic Acid.
Michigan - Critical Materials Register: None.
Minnesota - List of Hazardous Substances: Inorganic Acid.
Missouri - Employer Information/Toxic Substance List: Inorganic Acid.
New Jersey - Right to Know Hazardous Substance List: Inorganic Acid.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: Inorganic Acid.
Pennsylvania - Hazardous Substance List: Inorganic Acid.
Rhode Island - Hazardous Substance List: Inorganic Acid.
Texas - Hazardous Substance List: Inorganic Acid.
West Virginia - Hazardous Substance List: Inorganic Acid.
Wisconsin - Toxic and Hazardous Substances: Inorganic Acid.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): This product does not contain any chemical on the Proposition 65 list.

ANSI LABELING (Z129.1): **CAUTION!** MAY CAUSE SENSITIZATION. MAY BE IRRITATING IF INHALED OR SWALLOWED. MAY CAUSE SKIN AND EYE IRRITATION. Do not taste or swallow. Do not get on skin or in eyes. Avoid breathing mists or sprays. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, and suitable body protection if necessary. FIRST-AID: In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention if any adverse effects occur. IN CASE OF FIRE: Use water fog, dry chemical, CO_2, or "alcohol" foam. IN CASE OF SPILL: Absorb spill with inert material and place in suitable container. Consult Material Safety Data Sheet for additional information.

ENVIRONMENTAL HAZARDS: 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.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: The chemicals in this product that are listed by CAS # are listed on the DSL/NDSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITY SUBSTANCES LISTS: None.

CANADIAN WHMIS SYMBOLS: Not applicable.

16. OTHER INFORMATION

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

DATE OF PRINTING September 24, 2012

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 which uniquely identifies each compound.

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

TLV - Threshold Limit Value - an airborne concentration of a substance which 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 Time Weighted Average **(TWA)**, the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level **(C)**. Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - 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 which was vacated by Court Order.

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. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). NIOSH issues exposure guidelines called **R**ecommended **E**xposure **L**evels (**REL**s). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); 1 (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

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

TOXICOLOGICAL INFORMATION:

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: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - 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/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. Data from several sources are used to evaluate the cancer-causing potential of the material. 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 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. **BEI** - 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.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act **(SARA)**; the Canadian Domestic/Non-Domestic Substances List **(DSL/NDSL)**; the U.S. Toxic Substance Control Act **(TSCA)**; Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act **(CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label.