

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

1. IDENTIFICATION

<u>TRADE NAME (AS LABELED):</u>	VITEC® 3000 NSF
<u>CHEMICAL NAME/CLASS:</u>	Not Applicable
<u>SYNONYM:</u>	Not Applicable
<u>PRODUCT USE:</u>	Water Treatment
<u>SUPPLIER/MANUFACTURER'S NAME:</u>	AVISTA TECHNOLOGIES
<u>ADDRESS:</u>	140 Bosstick Blvd San Marcos, CA 92069
<u>24 HOUR EMERGENCY NO.:</u>	1-800-424-9300 (United States)** 1-703 527-3887 (International Collect)
<u>BUSINESS PHONE:</u>	(760) 744-0536
<u>DATE OF PREPARATION:</u>	November 11, 2005; revised 6 March 2012; revised 29 July 2012; revised 14 May 2013

This product is sold for commercial use. This MSDS has been developed to address safety concerns of those individuals working with bulk quantities of this material, as well as those of potential users of this product in industrial /occupational settings. All pertinent health, safety and environmental information has been presented based on ANSI Z400.1-2003, the US Federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and Canadian Workplace Hazardous Materials Information System (WHMIS) and Controlled Products Regulations (CPR).

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL DESCRIPTION: This product is a clear, amber colored, solution with a light, disinfectant odor. This product is neither reactive nor flammable.

WARNINGS (per ANSI Z129.1)

WARNING! MAY CAUSE SKIN AND EYE BURNS. MAY BE IRRITATING IF INHALED. HARMFUL IF SWALLOWED.

PRECAUTIONS (per ANSI Z129.1):

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.



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

2. HAZARDS IDENTIFICATION (continued)

HAZARD SYMBOLS:

HMIS HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health	2
Flammability	0
Physical Hazard	0
Protective Equipment	C

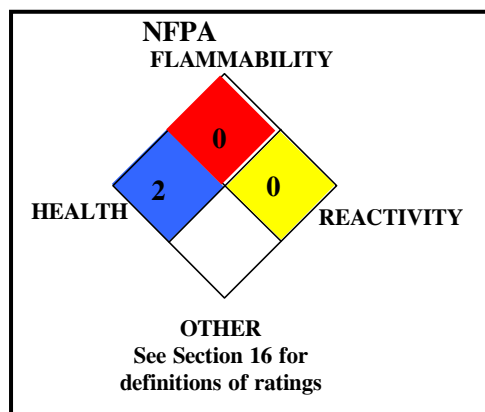
HMIS PERSONAL PROTECTIVE EQUIPMENT RATING: Industrial Use situations C; Safety glasses, gloves and body protection

CANADIAN WHMIS SYMBOLS:

D2B - Poisonous and infectious material - Other effects – Toxic



This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.



OSHA REGULATORY STATUS

This material is classified as not hazardous under OSHA regulations

POTENTIAL HEALTH EFFECTS

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

CONTACT WITH SKIN or EYES: Contact can cause eye or skin irritation. Prolonged skin contact can result in dermatitis. Prolonged eye exposure may include redness, pain, and tearing

SKIN ABSORPTION: No component of this product is reported to be absorbed through intact skin

INGESTION: If the product is swallowed, irritation of the mouth, throat, and other tissues of the gastro-intestinal system can occur.

INHALATION: Overexposure to vapors, mists, sprays, or dusts of this product can cause irritation to the respiratory tract.

2. HAZARDS IDENTIFICATION (continued)

INJECTION: Accidental injection of this product can cause burning, reddening, and swelling in addition to the wound. Symptoms of such exposure can include those described under "Inhalation", "Contact with Skin or Eyes," and "Ingestion".

CHRONIC EFFECTS: Long-term skin or eye contact can result in dermatitis or eye irritation.

SIGNS AND SYMPTOMS OF OVEREXPOSURE: Eye and skin irritation (redness or swelling). See Section 11: TOXICOLOGICAL INFORMATION.

POTENTIAL ENVIRONMENTAL EFFECTS

This product does not normally present a significant hazard to aquatic or terrestrial life in small quantities. 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. See Section 12: ECOLOGICAL INFORMATION.

3. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w
Alkyl phosphonate salt	Proprietary*	10 - 30
Phosphonic Acid Derivative Compound	Proprietary*	15 - 40
Alkaline salt	Proprietary*	10-30
Water and ingredients present in concentrations of less than 1% (or less than 0.1% if carcinogens)		Balance
The ingredients in the balance of this product do not contribute significant hazards beyond those described in this document.		
*Hazardous Materials Information Review Commission Registry Number 8535 filed 6 March 2012.		

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 if any adverse effects occur. Take a copy of label and MSDS to physician or health professional with victim.

FIRST AID PROCEDURES

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with warm, gently flowing running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Rinse for at least 60 minutes. Victim must seek immediate medical attention if any adverse exposure symptoms develop.

EYE EXPOSURE: If this product enters the eyes, immediately begin flushing victim's eyes with gently flowing, warm water. Open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 60 minutes. Victim must immediately seek medical attention.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. Victim must seek immediate medical attention if any adverse exposure symptoms develop. If necessary, use artificial respiration to support vital functions.

INGESTION: If this product is swallowed, **CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING**, unless directed by medical personnel. 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.

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

NOTE TO PHYSICIANS

Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLAMMABLE PROPERTIES

This product is non-combustible. Not sensitive to mechanical impact under normal conditions. Not sensitive to static discharge under normal conditions.

EXTINGUISHING MEDIA

SUITABLE EXTINGUISHING MEDIA:

<u>Water Spray:</u>	OK	<u>Carbon Dioxide:</u>	OK
<u>Foam:</u>	OK	<u>Dry Chemical:</u>	OK
<u>Halon:</u>	OK	<u>Other</u>	Any "ABC" Class

UNSUITABLE EXTINGUISHING MEDIA:

None.

PROTECTION OF FIREFIGHTERS

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL:

When involved in a fire, this product may decompose and produce irritating fumes and toxic gases (e.g., carbon monoxide, carbon dioxide, phosphorous oxides, phosphine and sodium oxide).

PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS:

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

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS

Responders should wear the level of protection appropriate to the type of chemical released, the volume of the material spilled, and the location where the incident has occurred.

ENVIRONMENTAL PRECAUTIONS

Minimize use of water to prevent environmental contamination. Prevent spill or rinsate from contamination of storm drains, sewers, soil or groundwater. Place all spill residues 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)

METHODS FOR CONTAINMENT

SPILL AND LEAK RESPONSE: Trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people.

RESPONSE TO INCIDENTAL RELEASES: Personnel who have received basic chemical safety training can generally handle small-scale releases, such as 1 container of this product. Respond to incidental chemical releases by wearing gloves, goggles, and appropriate body protection.

RESPONSE TO NON-INCIDENTAL RELEASES: Respond to non-incident chemical releases of this product, such as the simultaneous puncturing of several containers, by clearing the impacted area and contacting appropriate emergency personnel. Clean up should only be done by qualified personnel.

METHODS FOR CLEAN-UP

Prevent spill or rinsate from contaminating storm drains, sewers, soil or groundwater. Absorb spilled liquid with polypads or other suitable absorbent materials. DO NOT use combustible materials, such as sawdust.

OTHER INFORMATION

US regulations require reporting spills reach any surface waters. The toll-free phone number for the US Coast Guard National Response Center is 1-800-424-8802.

7. HANDLING and STORAGE

HANDLING

As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after using this product. Do not eat or drink while using this material. Avoid generating dusts, mists or sprays of this product. Remove contaminated clothing immediately. Do not breathe (dust, vapor, mist, gas). Avoid contact with skin, eyes or clothing. In the event of a spill, follow practices indicated in Section 6 (Accidental Release Measures). During maintenance activities make certain that application equipment is locked and tagged-out safely if necessary. Collect any rinsates and dispose of according to applicable U.S. Federal, State, or local procedures or appropriate Canadian standards.

STORAGE

This product is stable under ordinary conditions of handling, use and storage. 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). Keep container tightly closed when not in use. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES:

<u>CHEMICAL NAME</u>	<u>CAS #</u>	<u>Guideline</u>	<u>Value</u>
Alkyl phosphonate salt	Proprietary*	NE	NE
Phosphonic Acid Derivative Compound	Proprietary*	NE	NE
Alkaline salt	Proprietary*	TLV-TWA (ACGIH) TLV-STEL (ACGIH) PEL-TWA (OSHA) REL-TWA (NIOSH) IDLH (NIOSH)	NE 2 mg/m ³ C 2 mg/m ³ 2 mg/m ³ C 10 mg/m ³

NE = Not Established. See Section 16 for Definitions of Terms Used. *Hazardous Materials Information Review Commission Registry Number 8535 filed 6 March 2012.

ENGINEERING CONTROLS

Use with adequate ventilation to ensure exposure levels are maintained below the limits provided above.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

EYE/FACE PROTECTION

For specific industrial applications, enhanced eye protection can be necessary. Use approved safety goggles or safety glasses, as described in OSHA 29 CFR 1910.133. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or appropriate Canadian standards.

SKIN PROTECTION

For specific industrial applications, wear chemical impervious gloves (e.g., Neoprene or Nitrile). If necessary, refer to U.S. OSHA 29 CFR 1910.138 or the appropriate standards of Canada. For consumer use, no specific body protection is normally needed.

BODY PROTECTION

For general industrial applications, chemically protective clothing is not normally needed. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects can pierce the soles of the feet or where employee's feet can be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

RESPIRATORY PROTECTION

None needed under normal conditions of use or handling. Use NIOSH approved respirators if ventilation is inadequate to control dusts, mists, fumes or vapors. Maintain airborne contaminate concentrations below guidelines listed above. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres use of a full-face-piece pressure/demand SCBA or a full face-piece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (29 CFR 1910.134).

General Hygiene Considerations

There are no known hygiene hazards associated with this material when used or handled as recommended.

9. PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

<u>RELATIVE VAPOR DENSITY</u> (air = 1):	> 1	<u>EVAPORATION RATE</u> (BuAc =1):	Similar to water
<u>SPECIFIC GRAVITY</u> :	1.15-1.25	<u>MELTING/FREEZING POINT</u> :	0°C (32°F)
<u>SOLUBILITY IN WATER</u> :	Soluble	<u>BOILING POINT</u> :	100°C (212°F)
<u>VAPOR PRESSURE</u> , mm Hg @ 20°C:	18	<u>pH</u> (product, as supplied):	10.8-11.2
<u>COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT)</u>			Not Available

PHYSICAL STATE, APPEARANCE AND COLOR This product is a clear, amber liquid with a light disinfectant odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance and odor of this product can act as warning properties in the event of an accidental release

CHEMICAL PROPERTIES

<u>ODOR THRESHOLD</u> :	Not Available
<u>VOC, less water and exempt</u> :	None
<u>Weight % VOC</u> :	None
<u>FLASH POINT</u> : Not ignitable	<u>AUTOIGNITION TEMPERATURE</u> : Not ignitable
<u>FLAMMABLE LIMITS</u> (in air by volume, %):	
<u>Lower</u> : NA	<u>Upper</u> : NA

10. STABILITY and REACTIVITY

CHEMICAL STABILITY

Stable under normal circumstances of use and handling.

CONDITIONS TO AVOID

Avoid contact with incompatible chemicals and exposure to extreme temperatures.

INCOMPATIBLE MATERIALS

This product is not compatible with strong bases, strong acids, and powerful oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

Thermal decomposition of this product can generate dusts, irritating fumes, and toxic gases (e.g., Carbon monoxide, Carbon dioxide).

POSSIBILITY OF HAZARDOUS REACTIONS

This product is not expected to undergo hazardous polymerization, decomposition, condensation or self-reactivity.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: There are currently no toxicity data available for this product; the following toxicology information is available for components greater than 1% in concentration.

The following data are available for Phosphonic acid derivative:

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

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

LD₅₀ (Oral-Rat) 2100 mg/kg

LD₅₀ (Skin-Rabbit) > 6310 mg/kg

LD₅₀ (Oral-Quail) > 2510 mg/kg

LD₅₀ (Oral-Duck) > 2510 mg/kg

TDL_o (Oral-Rat) 1302 mg/kg/31 days-intermittent: Kidney, Urethra, Bladder: other changes in urine composition; Nutritional and Gross Metabolic: weight loss or decreased weight gain, changes in sodium.

The following data are available for Alkaline salt:

Standard Draize Test (Eye-Monkey) 1%/24 hours: Severe
Standard Draize Test (Skin-Rabbit) 500 mg/24 hours: Severe
Standard Draize Test (Eye-Rabbit) 400 µg: Mild
Standard Draize Test (Eye-Rabbit) 1%: Severe
Standard Draize Test (Eye-Rabbit) 50 µg/24 hours: Severe
Standard Draize Test (Eye-Rabbit) 1 mg/24 hours: Severe
Rinsed with water (Eye-Rabbit) 1 mg/30 seconds: Severe
LD₅₀ (Intraperitoneal-Mouse) 40 mg/kg
LDLo (Oral-Rabbit) 500 mg/kg
Cytogenetic Analysis (Parenteral-Grasshopper) 20 mg
Cytogenetic Analysis (Hamster-Lung) 10 mmol/L
Cytogenetic Analysis (Hamster-Ovary) 16 mmol/L

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

CHEMICAL	IARC	NTP	NIOSH	ACGIH	OSHA	CA PROP 65
Alkyl phosphonate salt	No	No	No	No	No	No
Phosphonic Acid Derivative Compound	No	No	No	No	No	No
Alkaline salt	No	No	No	No	No	No

IRRITANCY OF PRODUCT: This product can burn contaminated tissue.

SENSITIZATION TO THE PRODUCT: The components of this product are not reported to be sensitizers

TOXICOLOGICAL SYNERGISTIC PRODUCTS: None.

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

Mutagenicity: When used as directed, this product is not expected to produce mutagenic effects in humans

Embryotoxicity: When used as directed, this product is not expected to produce embryotoxic effects in humans.

Teratogenicity: When used as directed, this product is not expected to produce teratogenic effects in humans

Reproductive Toxicity: When used as directed, this product is not expected to produce reproductive toxicity in humans.

11. TOXICOLOGICAL INFORMATION (continued)

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

BIOLOGICAL EXPOSURES INDICES (BEIs): There are no BEI's established for any component of this product at this time.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ECOTOXICITY:

This product can be harmful to terrestrial plant and animal life if large volumes of it are released into the environment. Refer to Section 11, "Toxicological Information", for specific animal data. The following aquatic toxicity data is available for components of this product:

Alkaline salt:

Acute Hazard Level:
Lethal pH (goldfish) = 10.9
Lethal pH (bluegill) = 10.5
LC₁₀₀ (*Cyprinus carpio*) 24 hours = 180 ppm/ 25°C
TL_m (mosquito fish) 96 hours = 125 ppm/ fresh water
TL_m (bluegill) 48 hours = 99 mg/L/ tap water

Phosphonic acid derivative

NOEC (*Daphnia magna*) 48 hours = 125 mg/L
NOEC (Rainbow Trout) 96 hours = 180 mg/L
NOEC (*Selenastrum* algae) 96 hours = 5.2 mg/L
EC₅₀ (*Selenastrum* algae) 96 hours = 1.9 mg/L
EC₅₀ (*Daphnia magna*) 48 hours = 242 mg/L

PERSISTENCE/DEGRADABILITY:

The following environmental data is available for components of this product:

Alkaline salt

Water Solubility = 111 g/100ml @ 20°C
BOD: None.

BIOACCUMULATION/ACCUMULATION:

Alkaline salt

Octanol/Water Partition Coefficient: SRP4: Too low to be measured (or possibly virtually 0)
Persistence: Can persist for extended periods of time.
Bioconcentration factor (BCF) Not determined.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Recover or recycle if possible. **Industrial Use**: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada.

EPA WASTE NUMBER: Not applicable to wastes consisting only of this product; however, the specific RCRA codes depend on the exact nature of the discarded material.

14. TRANSPORT INFORMATION

BASIC SHIPPING DESCRIPTION

This product is not hazardous per 49 CFR 172.101, the U.S. Department of Transportation.

PROPER SHIPPING NAME:

Not Regulated

HAZARD CLASS NUMBER and DESCRIPTION:

Not Regulated

UN IDENTIFICATION NUMBER:

Not Regulated

DOT LABEL(S) REQUIRED:

Not Regulated

PACKAGING GROUP:

Not Regulated

NORTH AMERICAN RESPONSE GUIDEBOOK NUMBER (2000):

Not Regulated

MARINE POLLUTANT:

No component is designated as a DOT Marine Pollutant.

NATIONAL MOTOR FREIGHT CLASSIFICATION: LTL: 100; T: 70

14. TRANSPORTATION INFORMATION (continued)

ADDITIONAL INFORMATION

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is not considered as dangerous goods, per Transport Canada regulations

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) REGULATIONS

This product is not hazardous per IATA regulations.

INTERNATIONAL MARITIME ORGANIZATION REGULATIONS (IMO):

This product is not hazardous per IMO regulations.

MARINE POLLUTANT:

No component is designated as a Marine Pollutant.

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO)

This product is not hazardous per ICAO regulations.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS - EPA REPORTING REQUIREMENTS:

The following reporting requirements are applicable to components of this product:

<u>CHEMICAL</u>	<u>SECTION 302 EHS (TPQ)</u> (40 CFR 355, Appendix A)	<u>SECTION 304 RQ</u> (40 CFR Table 302.4)	<u>SECTION 313 TRI (threshold)</u> (40 CFR 372.65)
Alkyl phosphonate salt	No	No	No
Phosphonic Acid Derivative Compound	No	No	No
Alkaline salt	No	YES, RQ = 1000 lbs.	No

U.S. SARA SECTION 311/312 FOR PRODUCT: None.

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):

This material is not found on either the Proposition 65 Carcinogen List or the Adverse Reproductive Effects List.

ADDITIONAL CANADIAN REGULATIONS:

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

16. OTHER INFORMATION

PREPARED BY:

ADVANCED CHEMICAL SAFETY, Inc.
PO Box 152329
San Diego, CA 92195
(858)-874-5577

DATE OF PRINTING

July 24, 2013

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 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 that represents conditions under which it is generally believed that nearly all workers can 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 that 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. Occupational Safety and Health Administration (OSHA). NIOSH issues exposure guidelines called Recommended Exposure Levels (RELs). When no exposure guidelines are established, an entry of **NE** is made for reference.

OEL - Occupational Exposure Level - In some cases, specific exposure guidelines have been assigned by industry. These are referred to as "Occupational Exposure Levels."

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 cause permanent injury and can be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). An "*" indicates that the health hazard is chronic. 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: **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**, **LDo**, **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.

Data from several sources are used to evaluate the cancer-causing potential of the material. The sources and ratings are: **IARC** - the International Agency for Research on Cancer; **1** = Carcinogenic to humans, **2A**, **2B** = Probably carcinogenic to humans, **3** = Unclassifiable as to carcinogenicity in humans, and **4** = Probably not carcinogenic to humans. **NTP** - the National Toxicology Program; **K** = Known to be a human carcinogen, and **R** = Reasonably anticipated to be a human carcinogen. **RTECS** - the Registry of Toxic Effects of Chemical Substances. **OSHA** - Occupational Safety and Health Administration and **CAL/OSHA** - California's subunit of the Occupational Safety and Health Administration; **Ca** = Carcinogen defined with no further categorization. **ACGIH** - American Conference of Governmental Industrial Hygienists; **A1** = Confirmed human carcinogen, **A2** = Suspected human carcinogen, **A3** = Confirmed animal carcinogen with unknown relevance to humans, **A4** = Not classifiable as a human carcinogen, and **A5** = Not suspected as a human carcinogen. **NIOSH** - U.S. National Institute for Occupational Safety and Health; **Ca** = Potential occupational carcinogen, with no further categorization. **EPA** - U.S. Environmental Protection; **A** = Human carcinogen, **B** = Probable human carcinogen, **C** = Possible human carcinogen, **D** = Not classifiable as to human carcinogenicity, **E** = Evidence of Non-carcinogenicity for humans, **K** = Known human carcinogen, **L** = Likely to produce cancer in humans, **CBD** = Cannot be determined, **NL** = Not likely to be carcinogenic in humans, and **I** = Data are inadequate for an assessment of human carcinogenic potential.

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 that appear on a material's industrial package label.