MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):	**NUTRI-PHITE® P SOIL HI-GRADE**
CHEMICAL NAME/CLASS:	Inorganic Acid Solution
PRODUCT NUMBER:	0-60-5
PRODUCT USE:	Fertilizer
FACTORY FORMULA:	01108
SUPPLIER/MANUFACTURER'S NAME:	**VERDESIAN LIFE SCIENCES, U.S., LLC**
ADDRESS:	12222 Ave 352 Visalia, CA 93291
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	(559) 635-4784
FAX PHONE:	(559) 625-9255
DATE OF PREPARATION:	January 2, 2003
DATE UPDATED:	December 30, 2013

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
Phosphorous Acid	13598-36-2	>70	NE	NE	NE	NE	NE	NE
Water and other components. Each of the other components are present in less than 1 percent concentration (or 0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).		Balance	None of the other components contribute significant, additional, hazards at the concentrations present in this product. All pertinent hazard 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).					

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

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

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This clear, colorless to pale yellow, pungent liquid is highly corrosive. This solution can irritate, redden, and burn skin, eyes, and other contaminated tissue. This product is not flammable; however, if exposed to high temperatures, toxic decomposition products (e.g., phosphine, phosphorus compounds) will be generated. Flammable hydrogen gas may be generated by contact with metals. This solution will generate a small amount of heat when in contact with water. Persons who respond to releases of this product must protect themselves from inhalation of acidic vapors and mists from this product, especially in areas which are downwind of the spill. Extreme caution must be used when responding to spills. Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The chief routes of overexposure to this product are via inhalation of mists or sprays generated by this product and contact with skin or eyes. The symptoms of overexposure, via route of entry, are as follows:

INHALATION: If mists or sprays of this product are inhaled, they may cause pulmonary irritation, irritation of the mucus membranes, coughing, laryngitis, headache, nausea, vomiting and a sore throat. Prolonged overexposures or exposures to high concentrations of mists or sprays of this solution may damage the tissues of the respiratory system. Severe overexposures can cause pulmonary edema, chemical pneumonitis, and other adverse health consequences. Chronic exposure to the vapors of this product can cause dental erosion. Severe overexposures may be fatal.

3. HAZARD IDENTIFICATION (Continued)

CONTACT WITH SKIN or EYES: Eye contact can cause irritation, pain, reddening, and blindness. Skin contact can cause reddening, discomfort, irritation, chemical burns, blistering of the skin, and scarring. Repeated skin overexposures can cause dermatitis (dry, red skin).

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 can irritate and burn the mouth, throat, esophagus, and other tissues of the digestive system. Symptoms of such overexposure can include nausea, vomiting, and diarrhea. Ingestion of large volumes of this product may be fatal.

INJECTION: Accidental injection of this product, via laceration or puncture by a contaminated object, may cause pain and irritation in addition to the wound.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. In the event of exposure, the following symptoms may be observed:

ACUTE: This solution is corrosive and can severely irritate and damage eyes, skin, mucous membranes, and any other exposed tissue. Skin contact can cause chemical burns, blisters, and scars; eye contact may cause blindness. Inhalation can cause irritation, coughing, and difficulty breathing. Severe overexposures by inhalation and ingestion may be fatal.

CHRONIC: Repeated skin overexposures can cause dermatitis (dry, red skin). Chronic exposure to the vapors of this product can cause dental erosion. See Section 11 (Toxicological Information) for additional data.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH	(BLUE)	3
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	1
PROTECTIVE EQUIPMENT		X

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For routine applications of this solution.

See Section 16 for Definition of Ratings

TARGET ORGANS: ACUTE: Skin, eyes, respiratory system, CHRONIC: Skin, teeth

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

4. FIRST-AID MEASURES

Victims must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of the label and MSDS to physician or health professional with victim.

SKIN EXPOSURE: If the product contaminates the skin, immediately decontaminate the affected area with running water. The minimum recommended flushing time is at least 15 minutes. If necessary, remove exposed or contaminated clothing, taking care not to contaminate eyes.

EYE EXPOSURE: If this product enters the eyes, open the victim's eyes while under gently running water. Use sufficient force to open eyelids. Have the victim "roll" eyes. Minimum flushing is for 15 minutes. Seek immediate medical attention.

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

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 diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs naturally, position head lower than chest area in order to prevent aspiration into the lungs.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting respiratory problems, dermatitis, other skin disorders, and conditions involving the Target Organs (See Section 3, Hazard Identification) can be aggravated by exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure. The following evaluations may be useful: lung function tests, chest x-rays.

5. FIRE-FIGHTING MEASURES

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

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

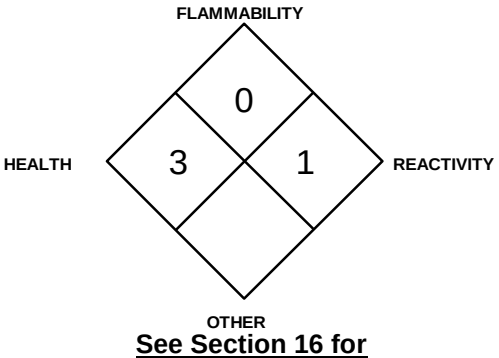
FIRE EXTINGUISHING MATERIALS:

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

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is corrosive and presents a severe contact hazard to firefighters. When involved in a fire and exposed to extremely high temperatures, this product will decompose to produce acidic vapors and toxic gases (e.g., phosphine, phosphorous oxides). Flammable hydrogen gas may be generated by contact with metals. This solution will generate a small amount of heat when in contact with water.

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. Chemical resistant clothing may be necessary. Responders must protect all downwind exposures from inhalation of the acid mist or vapors. 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. If necessary, neutralize any contaminated fire-response equipment with sodium bicarbonate or other acid-neutralizing agent before returning such equipment to service.

6. ACCIDENTAL RELEASE MEASURES

RELEASE RESPONSE: In case of a release, clear the affected area and protect people. Uncontrolled releases should be responded to by appropriately trained personnel in proper personal protective equipment, using pre-planned procedures.

In terms of small, incidental releases (e.g., 1 gallon from a leaking container), the minimum personal protective equipment should be as follows: gloves, goggles, face shield, and appropriate body protection (e.g., boots, Tyvek suit). For large, non-incidental releases (e.g., 55-gallon drum), Minimum Personal Protective Equipment should be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and Self Contained Breathing Apparatus).**

If necessary, dike the spill to prevent releases from contaminating environmentally sensitive areas. Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize area with sodium bicarbonate or other acid neutralizing agent. Rinse area with water. Test area with litmus paper to insure neutralization is complete. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. Dispose residue in accordance U.S. Federal, State, or local procedures and appropriate Canadian standards (see Section 13, Disposal Considerations).

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

7. HANDLING and STORAGE

WORK 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, drink, smoke, or apply cosmetics while handling this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES -- NON-BULK CONTAINERS: All employees who handle this material should be trained to handle it safely. Open containers and drums slowly on a stable surface. Open drum bunks carefully to relieve any pressure build-up which may have developed during storage. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. 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. Use corrosion-resistant structural materials, lighting, and ventilation systems in the storage area. Floors should be sealed to prevent absorption of this material. Keep container tightly closed when not in use. Inspect all incoming containers before storage to ensure that containers are properly labeled and not damaged.

7. HANDLING and STORAGE (Continued)

INTERMEDIATE BULK CONTAINERS AND PROCESS EQUIPMENT: Ensure material in bulk containers and process lines is properly labeled. Close all valves tightly when product is not being used. Determine that lines are not contaminated with incompatible materials before use in operations involving this product. Secondary containment (dikes and berms) should be used. Periodic inspection and maintenance of bulk containers and process equipment must be conducted.

TANK CAR SHIPMENTS: Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Exposure Controls - Personal Protection). All loading and unloading equipment must be inspected prior to each use. Loading and unloading operations must be attended at all times. Tank cars must be level and wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operation. All lines must be blown down and purged before disconnecting them from the tank car or vessel.

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 and appropriate Canadian standards (see Section 13, Disposal Considerations).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to prevent inhalation of sprays or mists. All operations should be directed at minimizing the generation of aerosols, sprays, or mists. Use corrosion-resistant ventilation and other engineering controls. Eyewash stations/safety showers should be near areas where this product is used or sprayed.

RESPIRATORY PROTECTION: 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: Splash goggles or safety glasses. Wear face shield for operations involving more than 1 gallon of this solution in which splashes or sprays can be generated.

HAND PROTECTION: Wear Neoprene gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task (e.g., coveralls or rubber apron).

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Not established.
EVAPORATION RATE (n-BuAc = 1): Not established.
DENSITY: 12.35 lb/gal
MELTING/FREEZING POINT: Not established.
SOLUBILITY IN WATER: Completely soluble.
BOILING POINT: Not established.
VAPOR PRESSURE, mm Hg @ 20°C (68°F): Not established.
pH: < 1.0
ODOR THRESHOLD: Not established.
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.
APPEARANCE AND COLOR: This is a clear, colorless, solution with a faint to slight odor.
HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn red upon contact with this solution. The appearance and odor may also act as distinguishing characteristics of this product.

10. STABILITY and REACTIVITY

STABILITY: Stable. This solution will generate a small amount of heat when in contact with water.

DECOMPOSITION PRODUCTS: When exposed to extremely high temperatures, this product will decompose to produce acidic vapors and toxic gases (e.g., phosphine, phosphorous oxides). Flammable hydrogen gas may be generated by contact with metals.

10. STABILITY and REACTIVITY (Continued)

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong bases, strong oxidizers, metals, and water-reactive materials.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Exposure to or contact with extreme temperatures and incompatible materials.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The specific toxicology data available for components greater than 1% in concentration are as follows.

ORGANIC ACID: No toxicology data are currently available for this component of this product.

SUSPECTED CANCER AGENT: This product's components are not found on the following lists: U.S. 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 severely irritating and corrosive to contaminated tissue.

SENSITIZATION TO THE PRODUCT: No component of this product is a sensitizer after prolonged or repeated exposure.

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.
Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.
Teratogenicity: This product is not reported to produce teratogenic effects in humans.
Reproductive Toxicity: This product is not reported to produce reproductive effects in humans.

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.

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

12. ECOLOGICAL INFORMATION

WORK PRACTICES MUST PREVENT UNINTENTIONAL, ENVIRONMENTAL RELEASES.

ENVIRONMENTAL STABILITY: The components of this solution are relatively stable, but will decompose over time to generate other inorganic compounds. The following environmental data are available for the components of this product:

ORGANIC ACID: Water solubility: 425 g/ 100 cc (20EC)

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This solution is corrosive and poses a severe contact hazard to terrestrial lifeforms. Animals exposed to this product will experience tissue damage, burns, and may be killed. Refer to Section 11 (Toxicology Information) for additional data on this product's components. Plants growing in soils contaminated with excessive amounts of this product may be adversely affected or destroyed.

EFFECT OF CHEMICAL ON AQUATIC LIFE: This solution is strongly acidic and can be detrimental to aquatic life. A large release of this product in a river or other body of water will kill fish and other aquatic life.

13. DISPOSAL CONSIDERATIONS

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

U.S. EPA WASTE NUMBER: D002 (Characteristic/Corrosivity) applicable to wastes consisting only of this product.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 U.S. DEPT. OF TRANSPORTATION.

PROPER SHIPPING NAME:	Phosphorous Acid
HAZARD CLASS NUMBER and DESCRIPTION:	8 (Corrosive)
UN IDENTIFICATION NUMBER:	UN 2834
PACKING GROUP:	III
DOT LABEL(S) REQUIRED:	CORROSIVE

NORTH AMERICAN EMERGENCY RESPONSE GUIDE NUMBER (1996): 154

MARINE POLLUTANT: This product does not contain any products which are designated by the Department of Transportation to be Marine Pollutants as per 49 CFR 171.101, Appendix B.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for preparation of Canadian shipments. Additional Canadian information is provided below.

LTC INDEX:	15
LIMIT PASSENGER CARRYING VEHICLE:	25 kg (55 lb)

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

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

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

U.S. CERCLA REPORTABLE QUANTITY (RQ): 100 lb (45.4 kg) for D002 unlisted (Characteristic/Corrosivity) wastes.

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

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

ANSI LABELING (Z129.1): **DANGER!** CORROSIVE MATERIAL! LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. MAY CAUSE LUNG DAMAGE. Do not get into eyes or on skin or clothing. Avoid breathing spray or mist. Do not take internally. Use with adequate ventilation and employ respiratory protection when exposed to the mist or spray. When handling, wear chemical splash goggles, face shield, rubber gloves, and protective clothing. Do not transfer to unlabeled containers. Wash thoroughly after handling, Keep container closed when not in use. **FIRST-AID:** In case of contact, immediately flush skin or eyes for at least 15 minutes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If ingested, do not induce vomiting. **IN CASE OF FIRE:** Use dry chemical, CO_2, or alcohol foam. **IN CASE OF SPILL:** Neutralize residue with sodium bicarbonate or other acid neutralizing agent. Place residue in suitable container and seal. Refer to MSDS for additional information.

15. REGULATORY INFORMATION (Continued)

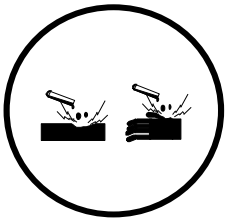
ADDITIONAL CANADIAN REGULATIONS:

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

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION AGENCY (CEPA) PRIORITY SUBSTANCES LISTS: The components of this product are not on the CEPA Priority Lists

CANADIAN WHMIS SYMBOLS: **Class E:** Corrosive



16. OTHER INFORMATION

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

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 constituent.

EXPOSURE LIMITS IN AIR:

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. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**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 causes 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:

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: **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. 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. 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:

This section explains the impact of various laws and regulations on the material. **U.S.: EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA: CEPA** is the Canadian Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDSL** are the Canadian Domestic/Non-Domestic Substances Lists.