

# 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): **EXCITE 17-17-17™**  
CHEMICAL NAME/CLASS: Inorganic Salt Mixture  
PRODUCT NUMBER: 17-17-17  
PRODUCT USE: Fertilizer  
SUPPLIER/MANUFACTURER'S NAME: **Source To Source (a Tap Family Company)**  
ADDRESS: 3233 South "I" Street  
Tulare, CA 93274  
TOLL FREE PHONE (U.S. & Canada): 866-727-4572  
BUSINESS PHONE: 559-686-5115  
FAX PHONE: 559-656-5294  
EMERGENCY PHONE: CHEMTREC: 1-800-424-9300 (U.S., Canada, Puerto Rico) 24-hrs  
INTERNATIONAL: +1-703-527-3887 (International) 24-hrs  
DATE OF PREPARATION: February 4, 2010

NOTE: These products have been classified in accordance with the hazard criteria of the CPR. All US (29 CFR 1910.1200), and Canada WHMIS (Controlled Products Regulations). It is located in appropriate sections based on the ANSI Z400.1-2004 format.

### 2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w
The total analysis for this product indicates that there is 17% Total Nitrogen (as N) [3% Ammoniacal Nitrogen, 3% Nitrate Nitrogen, 11% Urea Nitrogen], 17% Available Phosphate (as P <sub>2</sub> O <sub>5</sub> ) and 17% Soluble Potash (as K <sub>2</sub> O) and Boron (as BN) 0.02%, Chelated Copper (as Cu) 0.05%, Chelated Iron (as Fe) 0.10%, Manganese (as Mn) 0.05%, Molybdenum (as Mo) 0.0005%, Zinc (as Zn) 0.05%.		
Potassium Nitrate	7757-79-1	10-30%
Urea	57-13-6	10-30%
Ammonium Salt	Proprietary	10-30%
Ascophyllum nodosum Extract	84775-78-0	10-30%
Inorganic Potassium Compound	Proprietary	3.0-7.0%
Other Trace Ingredients, including chelated copper, iron, manganese, borate, molybdate and zinc compounds.		

### 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW:** *Product Description:* This product is a light and dark blue, granulated powder with a characteristic odor of fertilizer. *Health Hazards:* This product can cause moderate irritation of contaminated skin, eyes, or mucous membranes by skin or eye contact and inhalation. *Flammability Hazards:* This product may be combustible. As an organic solid, this product requires substantial pre-heating before ignition occurs. If involved in a fire this product may produce toxic gases and irritating compounds (e.g., nitrogen oxides, manganese oxides, sulfur oxides, zinc oxides, phosphorous oxides, ammonia, hydrogen, cyanide, cyanuric acid and other organic materials). *Reactivity Hazards:* This product is not reactive. *Environmental Hazards:* This product is a fertilizer; release of large quantity to the environment may substantially alter the nutrient composition and adversely affect plant and animal life in terrestrial and aquatic environments. *Emergency Response Considerations:* Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

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

### 4. FIRST-AID MEASURES

Persons who experience adverse reactions to this product should be taken for medical attention. Take a copy of the label and MSDS to physician or health professional with victim.

**EYE EXPOSURE:** If product contacts the eyes rinse eyes thoroughly. If irritation occurs, open victim's eyes while under gently running water. Use sufficient force to open eyelids and then "roll" while flushing eyes. Minimum flushing is for at least 20 minutes. If the exposure has resulted in an adverse effect, seek medical attention.

**SKIN EXPOSURE:** If product contaminates the skin and adverse effect occurs, immediately decontaminate the affected area with running water. The minimum recommended flushing time is 20 minutes. If necessary, remove exposed or contaminated clothing, taking care not to contaminate eyes. Seek medical attention if adverse effect continues after rinsing.

**INHALATION:** If dusts of this product are inhaled, remove the victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect continues after removal to fresh air.

#### 4. FIRST-AID MEASURES (Continued)

**INGESTION:** If 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 11, Toxicological Information) can be aggravated by exposure to this product.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure.

#### 5. FIRE-FIGHTING MEASURES

**FLASH POINT:** Not determined.

**AUTOIGNITION TEMPERATURE:** Not determined.

**FLAMMABLE LIMITS (in air by volume, %):** Not determined.

**FIRE EXTINGUISHING MATERIALS:** Unless incompatibilities exist for surrounding materials, carbon dioxide, water spray, 'ABC' type chemical extinguishers, foam, dry chemical and halon extinguishers can be used to fight fires involving this product.

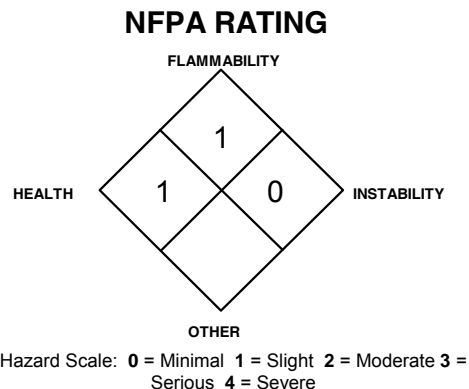
**FIRE EXTINGUISHING MATERIALS NOT TO BE USED:** None known.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** When involved in a fire and exposed to extremely high temperatures, this product will decompose to produce irritating vapors and toxic gases (e.g., nitrogen oxides, manganese oxides, sulfur oxides, zinc oxides, phosphorous oxides, ammonia, hydrogen, cyanide, cyanuric acid and other organic materials). This product contains potential skin sensitizers and so poses a possible contact hazard to fire-fighters.

Explosion Sensitivity to Mechanical Impact: Not applicable.

Explosion Sensitivity to Static Discharge: It is important to note that, as with all organic solids, large dust clouds of this product have the potential to ignite explosively.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. 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:** 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. Eliminate all sources of ignition before cleanup begins. The atmosphere must have levels of components lower than those listed in Section 8, (Exposure Controls and Personal Protective Equipment), if applicable, and have at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus (SCBA).

*Small Spills:* Sweep-up spilled solid, avoiding generation of dusts, wearing gloves, goggles and apron.

*Large Spills:* 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**. For large spills, dike or otherwise contain spill and remove to storage/salvage containers. Decontaminate the area thoroughly. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Monitor area to ensure that exposure levels are below exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area.

Place all spill residue in a double plastic bag or other containment and seal. Do not mix with wastes from other materials. Do not allow spill to contaminate waterways. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.

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

#### 7. HANDLING and STORAGE

**WORK 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 dusts generated by this product when in dilute form. Wipe down work areas to avoid accumulation of dusts. Remove contaminated clothing immediately.

**STORAGE AND HANDLING PRACTICES -- NON-BULK CONTAINERS:** All employees who handle this product should be trained to handle them 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. All containers of this product must be properly labeled. Empty containers may contain residual amounts of 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).

## 7. HANDLING and STORAGE (Continued)

**STORAGE AND HANDLING PRACTICES -- NON-BULK CONTAINERS (continued):** Material should be stored in secondary containers or in a diked area, as appropriate. Keep container tightly closed when not in use. Inspect all incoming containers before storage to ensure that containers are properly labeled and are not damaged. Refer to NFPA 654, *Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids* for additional information on storage. Have appropriate extinguishing equipment in the storage area (e.g., sprinkler system, portable fire extinguishers).

**STORAGE AND HANDLING PRACTICES -- BULK CONTAINERS:** Bulk containers (e.g., 250 gallon "mini-bulk" tanks) holding this product should be loaded and unloaded in strict accordance with container manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Personal Protection). All transfer and dilution equipment must be inspected prior to each use. Transfer and dilution operations must be attended at all times. Hoses must be verified to be clean and free of incompatible chemicals prior to connection to the tank. Valves and hoses must be verified to be in the correct positions prior to starting transfer and dilution operations.

**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 in accordance 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. Eyewash stations/safety showers should be near areas where this product is used.

### EXPOSURE LIMITS/GUIDELINES:

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELs		NIOSH	OTHER
		TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	TWA mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	IDLH mg/m <sup>3</sup>	mg/m <sup>3</sup>
Ascophyllum nodosum Extract	84775-78-0	NE	NE	NE	NE	NE	NE	NE	NE
Proprietary Ammonium Salt		NE	NE	NE	NE	NE	NE	NE	NE
Proprietary Inorganic Potassium Compound		NE	NE	NE	NE	NE	NE	NE	NE
Potassium Nitrate	7757-79-1	NE	NE	NE	NE	NE	NE	NE	NE
Urea	57-13-6	NE	NE	NE	NE	NE	NE	NE	AIHA WEELs: TWA = 10

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

**RESPIRATORY PROTECTION:** Use NIOSH approved respirators if ventilation is inadequate to control dust generation. Maintain airborne contaminate concentrations below guidelines listed in this Section. 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 a face shield when using more than 1 gallon of this product. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or the Canadian CSA Standard Z94.3-02, *Industrial Eye and Face Protectors*.

**HAND PROTECTION:** Wear rubber gloves for routine industrial use. Resistance of specific materials can vary from product to product. Evaluate resistance under conditions of use and maintain clothing carefully. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS. If necessary, refer to U.S. OSHA 29 CFR 1910.138.

**BODY PROTECTION:** Use body protection appropriate for task. Clothing such as protective coveralls with long sleeves and full-length legs is suggested. Full-body chemical protective clothing is recommended for emergency response procedures. If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment). If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-02, *Protective Footwear*.

## 9. PHYSICAL and CHEMICAL PROPERTIES

**RELATIVE VAPOR DENSITY (air = 1):** Not applicable.

**EVAPORATION RATE (n-BuAc = 1):** Not applicable.

**DENSITY:** > 1

**MELTING/FREEZING POINT:** Not available.

**SOLUBILITY IN WATER:** Completely soluble.

**BOILING POINT:** Not applicable.

**VAPOR PRESSURE:** Not established.

**pH (1% solution):** ~ 5.0-6.5

**ODOR THRESHOLD:** Not determined.

**COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT):** Not established.

**APPEARANCE, ODOR and COLOR:** This product is a light and dark blue, granulated powder with a characteristic odor of fertilizer.

## 9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

**HOW TO DETECT THIS SUBSTANCE (warning properties):** The appearance and odor may be a distinguishing characteristic to identify this product if accidentally released.

## 10. STABILITY and REACTIVITY

**STABILITY:** Stable under conditions of normal temperature and pressure. May decompose or discolor upon prolonged exposure to air or heat.

**DECOMPOSITION PRODUCTS:** Combustion: When exposed to extremely high temperatures, this product will decompose to produce irritating vapors and toxic gases (e.g., nitrogen oxides, manganese oxides, sulfur oxides, zinc oxides, phosphorous oxides, ammonia, hydrogen, cyanide, cyanuric acid and other organic materials). Hydrolysis: None known.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Strong oxidizers, strong bases, strong reducers, sodium hypochlorite, calcium hypochlorite, phosphorus pentachloride, chromyl chloride, nitrosyl perchlorate, gallium perchlorate, titanium tetrachloride.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** Exposure to extreme temperatures and incompatible materials.

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

### 11. TOXICOLOGICAL INFORMATION

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

**INHALATION:** Inhalation of dusts may be irritating to the nose, throat and exposed mucous membranes. Symptoms of such exposure may include coughing, sneezing, and sore throat. Symptoms are generally alleviated when overexposure ends.

**CONTACT WITH SKIN or EYES:** In most individuals, skin contact is not expected to cause significant adverse effects. Prolonged contact with skin may cause irritation and reddening of exposed tissue. Direct contact with eyes will lead to tearing, pain, reddening, and irritation.

**SKIN ABSORPTION:** The Urea component is rapidly absorbed via intact skin. This absorption may also carry other components and other contaminants into the bloodstream and cause adverse systemic effects.

**INGESTION:** Though not a likely route of occupational exposure, ingestion can lead to irritation of the throat, esophagus, and other tissues of the digestive system. Symptoms of such exposure may include abdominal pain, nausea, persistent violent vomiting, excitement, convulsion and diarrhea. Ingestion of large quantity may be harmful or fatal.

**INJECTION:** Injection of this product, via puncture with a contaminated object, will lead to a burning sensation, reddening, and swelling around the site of injection.

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

**ACUTE:** Skin, eye and respiratory system contact may be irritating. Ingestion may be harmful or fatal if large quantities are ingested.

**CHRONIC:** Chronic exposure to this product via skin contact may cause dermatitis.

**TARGET ORGANS:** ACUTE: Skin, eyes, gastrointestinal system. CHRONIC: Skin.

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

#### INORGANIC POTASSIUM COMPOUND:

LD<sub>50</sub> (Skin-Rabbit) > 4640 mg/kg  
LDLo (Oral-Rat) 4640 mg/kg; Behavioral: somnolence (general depressed activity); Gastrointestinal: other changes

#### POTASSIUM NITRATE:

LD<sub>50</sub> (Oral-Rat) 3750 mg/kg  
LD<sub>50</sub> (Oral-Rat) 3540 mg/kg; Lungs, Thorax, or Respiration: other changes; Liver: other changes; Kidney/Ureter/Bladder: other changes  
LD<sub>50</sub> (Oral-Rabbit) 1901 mg/kg  
LDLo (Intravenous-Cat) 100 mg/kg  
TDLo (Oral-Rat) 10 mg/kg; Blood: methemoglobinemia-carboxyhemoglobin; Nutritional and Gross Metabolic: weight loss or decreased weight gain

#### POTASSIUM NITRATE (continued):

TDLo (Oral-Rat) 36 gm/kg/90 days-intermittent; Gastrointestinal: other changes  
TDLo (Oral-Rat) 2250 mg/kg/150 days-intermittent; Endocrine: thyroid weight (goiter), evidence of thyroid hypofunction; Nutritional and Gross Metabolic: weight loss or decreased weight gain  
TDLo (Oral-Rat) 22 gm/kg; female 1-22 day(s) after conception; Reproductive: Fertility: other measures of fertility  
TDLo (Oral-Rat) 598 mg/kg; female 1-22 day(s) after conception lactating female 5 day(s) post-birth; Reproductive: Effects on Newborn: behavioral  
TDLo (Oral-Rat) 6505 mg/kg; female 23-27 day(s) after conception; Reproductive: Fertility: abortion  
TDLo (Oral-Rat) 15 gm/kg; female 24 week(s) pre-mating; Reproductive: Effects on Newborn: stillbirth

#### POTASSIUM NITRATE (continued):

TDLo (Oral-Rat) 1670 gm/kg; female 29 week(s) pre-mating; Reproductive: Fertility: female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated); Effects on Embryo or Fetus: other effects to embryo  
Gene Conversion and Mitotic Recombination (Bacteria-*Escherichia coli*) 5 pph  
**SODIUM BORATE:**  
LDLo (Oral-Infant) 1 gm/kg  
LDLo (Oral-Man) 709 mg/kg; Behavioral: convulsions or effect on seizure threshold; Cardiac: change in rate; Gastrointestinal: nausea or vomiting  
LD<sub>50</sub> (Oral-Rat) 2660 mg/kg  
LD<sub>50</sub> (Oral-Mouse) 2 gm/kg  
LD<sub>50</sub> (Oral-Guinea Pig) 5330 mg/kg



#### HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	1
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FLAMMABILITY HAZARD	(RED)	1
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PHYSICAL HAZARD	(YELLOW)	0
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#### PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		SEE SECTION 8

For Routine Industrial Use and Handling Applications

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate  
3 = Serious 4 = Severe \* = Chronic hazard

## 11. TOXICOLOGICAL INFORMATION (Continued)

### TOXICITY DATA (continued):

#### SODIUM BORATE (continued):

LD<sub>50</sub> (Intraperitoneal-Mouse) 2711 mg/kg;  
Behavioral: altered sleep time (including change in righting reflex), convulsions or effect on seizure threshold, muscle contraction or spasticity  
LD<sub>50</sub> (Intravenous-Mouse) 1320 mg/kg  
LDLo (Oral-Dog) 3 gm/kg  
LDLo (Subcutaneous-Rabbit) 150 mg/kg  
TDLo (Oral-Rat) 70 gm/kg/90 days-continuous: Brain and Coverings: changes in brain weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain; Related to Chronic Data: changes in testicular weight  
TDLo (Oral-Rat) 377 gm/kg/2 years-continuous: Blood: pigmented or nucleated red blood cells; Nutritional and Gross Metabolic: weight loss or decreased weight gain; Related to Chronic Data: changes in testicular weight  
TDLo (Oral-Rat) 18,524 mg/kg/70 days-continuous: Endocrine: changes in spleen weight; Blood: other changes; Related to Chronic Data: changes in testicular weight  
TDLo (Oral-Rat) 70 gm/kg: male 90 day(s) pre-mating: Liver: changes in liver weight; Endocrine: changes in thyroid weight; Related to Chronic Data: changes in testicular weight; Reproductive: Paternal Effects: testes, epididymis, sperm duct  
TDLo (Oral-Rat) 70 gm/kg: female 90 day(s) pre-mating: Reproductive: Maternal Effects: ovaries, fallopian tubes  
TDLo (Oral-Rat) 37 gm/kg: Multi-generations: Reproductive: Effects on Newborn: weaning or lactation index (e.g., # alive at weaning per # alive at day 4)  
TDLo (Oral-Dog) 35 gm/kg/90 days-continuous  
TDLo (Oral-Dog) 70 gm/kg: male 26 week(s) pre-mating: Reproductive: Paternal Effects: testes, epididymis, sperm duct  
Specific Locus Test (Oral-insect-*Drosophila melanogaster*) 714 ppm  
Cytogenetic Analysis (Oral-insect-*Drosophila melanogaster*) 714 ppm

#### SODIUM MOLYBDATE:

LC<sub>50</sub> (Inhalation-Rat) > 2080 mg/m<sup>3</sup>/4 hour  
LD<sub>50</sub> (Oral-Rat) 4 gm/kg  
LD<sub>50</sub> (Oral-Rat) 0.25 gm/kg: Gastrointestinal: contraction (isolated tissue); Liver: fatty liver degeneration; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)  
LD<sub>50</sub> (Oral-Dog) 0.25 gm/kg: Gastrointestinal: contraction (isolated tissue); Liver: fatty liver degeneration; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)  
LD<sub>50</sub> (Oral-Guinea Pig) 0.31 gm/kg: Gastrointestinal: contraction (isolated tissue); Liver: fatty liver degeneration; Kidney/Ureter/Bladder: changes in tubules (including acute renal failure, acute tubular necrosis)  
LD<sub>50</sub> (Intraperitoneal-Rat) 576 mg/kg  
LD<sub>50</sub> (Intraperitoneal-Mouse) 303 mg/kg  
LD<sub>50</sub> (Subcutaneous-Mouse) 570 mg/kg  
LD<sub>50</sub> (Intravenous-Cat) 917 mg/kg: Vascular: BP lowering not characterized in autonomic section; Lungs, Thorax, or Respiration: respiratory depression  
TDLo (Oral-Rat) 18,200 mg/kg/13 weeks-intermittent: Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: phosphatases, dehydrogenases  
TDLo (Oral-Rat) 3605 mg/kg/4 weeks-continuous: Liver: liver function tests impaired; Kidney/Ureter/Bladder: other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain  
TDLo (Oral-Rat) 5.25 gm/kg/21 days-intermittent: Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other oxidoreductases, transaminases

#### SODIUM MOLYBDATE (continued):

TDLo (Oral-Rat) 1050 mg/kg/5 weeks-intermittent: Blood: normocytic anemia; Musculoskeletal: other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain  
TDLo (Oral-Rabbit) 3343 mg/kg/26 days-continuous: Endocrine: evidence of thyroid hypofunction; Blood: other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain  
TDLo (Oral-Mammal-Domestic) 484 mg/kg/21 weeks-intermittent: Blood: other changes; Musculoskeletal: other changes Nutritional and Gross Metabolic: weight loss or decreased weight gain  
TDLo (Intratesticular-Mouse) 16,474 µg/kg: male 1 day(s) pre-mating: Reproductive: Paternal Effects: testes, epididymis, sperm duct  
Phage Inhibition Capacity (*Bacteria-Escherichia coli*) 16 mmol/L  
Sex Chromosome Loss and Non-Disjunction (*Yeast-Saccharomyces cerevisiae*) 80 mmol/L  
**UREA:**  
Standard Draize Test (Skin-Human) 22 mg/3 days-intermittent: Mild  
TDLo (Intraplacental-Woman) 1400 mg/kg: female 16 week(s) after conception: Reproductive: Fertility: abortion  
LD<sub>50</sub> (Oral-Rat) 8471 mg/kg  
TCLo (Inhalation-Rat) 288 mg/m<sup>3</sup>/17 weeks-intermittent: Kidney/Ureter/Bladder: other changes in urine composition; Blood: other changes; Nutritional and Gross Metabolic: changes in chlorine  
TDLo (Oral-Rat) 821 gm/kg/1 year-continuous: Tumorigenic: neoplastic by RTECS criteria; Blood: tumors, lymphoma, including Hodgkin's disease  
DNA Inhibition (Human Lymphocyte) 600 mmol/L

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

**IRRITANCY OF PRODUCT:** This product can be irritating to contaminated tissue upon prolonged or repeated exposure.

**SENSITIZATION TO THE PRODUCT:** The components of this product are not known to be human respiratory or skin sensitizers.

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

**Mutagenicity:** In studies of involving the Urea component, an increased incidence of chromosomal aberrations and sister chromatid exchanges were observed in peripheral lymphocytes of 25 male agricultural workers occupationally exposed to urea, as well as several pesticides including DDT and organophosphates. It is not possible to draw any conclusions from this study due to the concurrent exposures. Urea was mutagenic in cultured human leukocytes, without metabolic activation. However, the authors concluded the effect may be a non-specific effect of high molarity on cell division, rather than a direct effect of urea. In another study, urea was not mutagenic in cultured human lymphocytes. In a poorly reported study, urea was mutagenic in mouse bone marrow cells in vivo. It has also produced mutations in cultured mammalian cells.

**Embryotoxicity:** The components of this product are not reported to produce embryotoxic effects in humans.

**Teratogenicity:** The components of this product are not reported to cause teratogenic effects in humans.

**Reproductive Toxicity:** The components of this product are not reported to cause reproductive effects in humans. The Urea component has been shown to cross the placenta following subcutaneous injection and to be absorbed into the rat fetus.

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) determined for the components of this product.

## 12. ECOLOGICAL INFORMATION

**MOBILITY:** This product has not been tested for mobility in soil. It is expected to be highly mobile as a fertilizer. The following information is available for some components.

#### SODIUM BORATE:

This material is adsorbed by mineral portion of soil and slowly leaches. Some boron is adsorbed by iron and aluminum hydroxy compounds and clay minerals. Finer textured soils retain added boron longer than do coarse, sandy soils. Boron sorption by clay minerals and iron and aluminum oxides is pH dependent, with maximum sorption in the range 7-9. The amount of boron adsorbed depends on the surface area of the clay or oxide and this sorption is only partially reversible.

## 12. ECOLOGICAL INFORMATION (Continued)

### MOBILITY (continued):

#### UREA:

The adsorption of Urea was measured in six different British soils with organic carbon contents ranging from 1.76 to 36.5%. No adsorption was measurable in five of the soils. In a sixth soil (36.5% organic carbon), a Koc of 8 can be determined from the Freundlich isotherm. According to a classification scheme, this Koc value suggests that Urea is expected to have high mobility in soil. However, it has been reported that Urea can adsorb to humic acids by free-radical complexation. Complexed Urea may adsorb to soil more strongly than uncomplexed Urea.

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

#### SODIUM BORATE:

This material can persist 1 or more years, depending on soil type and rainfall. Less persistent in acid soils and in high rainfall areas. It leaches rapidly under high rainfall conditions.

#### UREA:

If released to air, a vapor pressure of 1.20X10<sup>-5</sup> mm Hg at 25°C indicates Urea will exist in both the vapor and particulate phases in the ambient atmosphere. Vapor-phase Urea will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 9.6 hrs. Particulate-phase Urea will be removed from the atmosphere by wet and dry deposition. If released to soil, Urea is expected to have very high mobility based upon a Koc of 8. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 1.74X10<sup>-12</sup> atm-cu m/mole. If released into water, Urea is not expected to adsorb to suspended solids and sediment based upon its Koc. Biodegradation is expected to be the major fate process in the aquatic ecosystem. Various screening studies have demonstrated that Urea can biodegrade readily with the release of carbon dioxide and ammonia. In a river die-away test-conducted at 5°C, 1.05-2.20% of added Urea hydrolyzed after 10-days while only 0.35% hydrolyzed in sterile controls. Urea was completely biodegraded in aerobic biodegradation studies using activated sludge and a 14-day incubation period. Volatilization from water surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Chemical hydrolysis is catalyzed by increasing temperatures, alkalinity, and especially the presence of the biological enzyme, Urease.

**BIO-ACCUMULATION POTENTIAL:** This product has not been tested for bio-accumulation potential. The following information is available for some components.

#### SODIUM BORATE:

This material bio-accumulates in plants. In a greenhouse experiment with sandy loam soil treated with 0-8.0 ppm boron as borax, boron toxicity symptoms appeared earliest in lentil plants and barley seedlings exposed to 8.0 ppm boron. In barley the severity of boron toxicity decreased with the decrease in boron levels, whereas in lentil the severity of the symptoms eventually reached the same level in 2 and 4 ppm boron treatments as with the highest concentration. Dry matter yield decreased 38.6% in lentil and 23.4% in barley exposed to 8.0 ppm boron in comparison with controls. Boron contents of lentil and barley plants on soil treated with 8 ppm boron were approximately 7- and approximately 8-fold those of control plants, respectively.

#### UREA:

In a 6 to 72 hr bioaccumulation study using carp (*Cyprinus carpio*), the concentration of Urea was found to be equally distributed between tissue and water during all time periods; thus, the BCF would be 1 for this species. In 3-day static-system tests using golden ide fish (*Leuciscus idus melanotus*), the BCF of Urea was < 10. According to a classification scheme, these BCF values suggest the potential for bioconcentration in aquatic organisms is low.

**ECOTOXICITY:** This product has not been tested for terrestrial aquatic or animal toxicity. This product is a fertilizer; release of large quantity to the environment may substantially alter the nutrient composition and adversely affect plant and animal life in terrestrial and aquatic environments. All accidental release to terrestrial, atmospheric and aquatic environments should be avoided. The following aquatic toxicity data is available for some components.

#### INORGANIC POTASSIUM COMPOUND:

LC<sub>50</sub> (*Capitella capitata* Polychaete worm) 28 days = 2400 µg/L; static  
LC<sub>50</sub> (*Neanthes arenaceodentata* Polychaete worm) 28 days = 1900 µg/L; static  
LC<sub>50</sub> (*Neanthes grubei* Polychaete) 28 days = 920 µg/L; static  
LC<sub>50</sub> (*Stauronereis rudolphi* Polychaete) 28 days = 2100 µg/L; static

#### POTASSIUM NITRATE:

LC<sub>50</sub> (*Daphnia magna* Water flea) 4.2 days = Conditions: freshwater; static; Concentration: 900 mg/L/total  
LC<sub>50</sub> (*Daphnia magna* Water flea) 24 hours = Conditions: freshwater; static; Concentration: 490 mg/L/total  
LC<sub>50</sub> (*Daphnia magna* Water flea) 48 hours = Conditions: freshwater; static; Concentration: 490 mg/L/total  
LC<sub>50</sub> (*Daphnia magna* Water flea) 72 hours = Conditions: freshwater; static; Concentration: 226 mg/L/total  
LC<sub>50</sub> (*Daphnia magna* Water flea) 96 hours = Conditions: freshwater; static; Concentration: 39 mg/L/total  
LC<sub>50</sub> (*Lepomis macrochirus* Bluegill) 24 hours = Conditions: freshwater; static; Concentration: 5500 mg/L/total  
LC<sub>50</sub> (*Gambusia affinis* Western mosquitofish) 24 hours = Conditions: freshwater; static; Concentration: 58500 µg/L/total  
LC<sub>50</sub> (*Gambusia affinis* Western mosquitofish) 48 hours = Conditions: freshwater; static; Concentration: 31100 µg/L/total  
LC<sub>50</sub> (*Gambusia affinis* Western mosquitofish) 96 hours = Conditions: freshwater; static; Concentration: 22,500 µg/L/total  
LC<sub>50</sub> (*Lepomis macrochirus* Bluegill, size 5-9 cm, wt 1-9 g) 96 hours = Conditions: freshwater; static; Concentration: 420,000 µg/L/total  
LC<sub>50</sub> (*Gambusia affinis* Western mosquitofish) 48 hours = Conditions: static; Concentration: 224 mg/L  
LC<sub>50</sub> (*Lepomis macrochirus* bluegill) 48 hours = Conditions: static; Concentration: 3575 mg/L  
LC<sub>50</sub> (*Lepomis macrochirus* bluegill) 72 hours = Conditions: static; Concentration: 3200 mg/L

#### POTASSIUM NITRATE (continued):

LC<sub>50</sub> (*Eisenia fetida* Earthworm, adult 300-600 mg) 48 hours = direct application using filter paper 144 µg/sq cm

#### SODIUM BORATE:

LC<sub>50</sub> (*Oncorhynchus mykiss* Rainbow Trout) 27 ppm (soft water; exposure was initiated subsequent to fertilization and maintained through 4 days post-hatching.) /Conditions of bioassay not specified in source examined  
LC<sub>50</sub> (*Oncorhynchus mykiss* Rainbow Trout) 54 ppm (hard water; exposure was initiated subsequent to fertilization and maintained through 4 days post-hatching.) /Conditions of bioassay not specified in source examined  
LC<sub>50</sub> (*Ictalurus punctatus* Catfish) 155 ppm (soft water; exposure was initiated subsequent to fertilization and maintained through 4 days post-hatching.) /Conditions of bioassay not specified in source examined  
LC<sub>50</sub> (*Ictalurus punctatus* Catfish) 71 ppm (hard water; exposure was initiated subsequent to fertilization and maintained through 4 days post-hatching.) /Conditions of bioassay not specified in source examined  
LC<sub>50</sub> (*Carassius auratus* Goldfish) 65 ppm (soft water; exposure was initiated subsequent to fertilization maintained through 4 days post-hatching.) /Conditions of bioassay not specified in source examined  
LC<sub>50</sub> (*Carassius auratus* Goldfish) 59 ppm (hard water; exposure was initiated subsequent to fertilization maintained through 4 days post-hatching.) /Conditions of bioassay not specified in source examined  
LC<sub>50</sub> (*Oncorhynchus mykiss* Rainbow Trout) 24 hours = 2.8 g/L; static /formulated product  
LC<sub>50</sub> (*Oncorhynchus mykiss* Rainbow Trout) 48 hours = 1.8 g/L; static /formulated product  
**UREA:**  
Toxicity Threshold (*Scenedesmus quadricauda* green algae) > 10,000 mg/l, toxic effect: multiplication inhibition of cell. /Time not specified  
Toxicity Threshold (*Entosiphon sulcatum* protozoa) > 29 mg/L, toxic effect: inhibition of cell multiplication. /Time not specified  
Toxicity Threshold (*Pseudomonas putida*) > 10,000 mg/L toxic effect: inhibition of cell multiplication. /Time not specified

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

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

## 13. DISPOSAL CONSIDERATIONS

**PREPARING WASTES FOR DISPOSAL:** 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:** Not applicable.

## 14. TRANSPORTATION INFORMATION

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

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

## 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, and are listed as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Potassium Nitrate (as a nitrate compound)	No	No	Yes

**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):** Not applicable..

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

**OTHER FEDERAL REGULATIONS:** Not applicable..

**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, Provided to Summarize Occupational Hazard Information):** **CAUTION!** MAY CAUSE SKIN, EYE IRRITATION. HARMFUL IF SWALLOWED. FOR AGRICULTURAL USE ONLY. KEEP AWAY FROM CHILDREN. WEAR GLOVES, SAFETY GOGGLES, AND APPROPRIATE BODY PROTECTION. ACCUMULATION OF DUSTS MAY PRESENT A HAZARD OF AIR/DUST EXPLOSION. Avoid contact with skin, eyes, and clothing. Avoid prolonged skin contact. Wash thoroughly after handling. Use in well-ventilated area. **FIRST-AID:** In case of skin or eye contact, flush with copious amounts of water. Recommended flushing time is for 20 minutes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. If adverse reactions occur, get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO<sub>2</sub> or "alcohol" foam. **IN CASE OF SPILL:** Absorb with an inert material (i.e. polypads), then place in a suitable container. Dispose of waste material according to all State, Federal and local regulations. Consult Material Safety Data Sheet for additional information.

### ADDITIONAL CANADIAN REGULATIONS:

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

**OTHER CANADIAN REGULATIONS:** Not applicable.

**CANADIAN ENVIRONMENTAL PROTECTION AGENCY (CEPA) PRIORITIES SUBSTANCES LISTS:** Not applicable.

**CANADIAN WHMIS CLASSIFICATION and SYMBOLS:** Not applicable.

## 16. OTHER INFORMATION

**PREPARED BY:** CHEMICAL SAFETY ASSOCIATES, Inc. • PO Box 1961, Hilo, HI 96721 • (800) 441-3365 • (808) 969-4846  
**DATE OF PRINTING:** July 23, 2010

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Source to Source, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Source to Source, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

## DEFINITIONS OF TERMS

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

**CAS #:** This is the Chemical Abstract Service Number that uniquely identifies each constituent.

### EXPOSURE LIMITS IN AIR:

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

**CAS #:** This is the Chemical Abstract Service Number that uniquely identifies each constituent.

**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.

**DFG MAK Germ Cell Mutagen Categories:** 1: Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed humans. 2: Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed mammals. 3A: Substances which have been shown to induce genetic damage in germ cells of human or animals, or which produce mutagenic effects in somatic cells of mammals *in vivo* and have been shown to reach the germ cells in an active form. 3B: Substances which are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell *in vivo*; in exceptional cases, substances for which there are no *in vivo* data, but which are clearly mutagenic *in vitro* and structurally related to known *in vivo* mutagens.

### EXPOSURE LIMITS IN AIR (continued):

**DFG MAK Germ Cell Mutagen Categories (continued):** 4: Not applicable (Category 4 carcinogenic substances are those with non-genotoxic mechanisms of action. By definition, germ cell mutagens are genotoxic. Therefore, a Category 4 for germ cell mutagens cannot apply. At some time in the future, it is conceivable that a Category 4 could be established for genotoxic substances with primary targets other than DNA [e.g. purely aneugenic substances] if research results make this seem sensible.) 5: Germ cell mutagens, the potency of which is considered to be so low that, provided the MAK value is observed, their contribution to genetic risk for humans is expected not to be significant.

**DFG MAK Pregnancy Risk Group Classification:** **Group A:** A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. **Group B:** Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed. **Group C:** There is no reason to fear a risk of damage to the developing embryo or fetus when MAK and BAT values are observed. **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, they are not sufficient for final evaluation.

**IDLH-Immediately Dangerous to Life and Health:** This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

**LOQ:** Limit of Quantitation.

**MAK:** Federal Republic of Germany Maximum Concentration Values in the workplace.



# DEFINITIONS OF TERMS (Continued)

## EXPOSURE LIMITS IN AIR (continued):

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

**NIC:** Notice of Intended Change.

**NIOSH CEILING:** The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

**NIOSH RELs:** NIOSH's Recommended Exposure Limits.

**PEL-Permissible Exposure Limit:** OSHA's Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL that was vacated by Court Order.

**SKIN:** Used when there is a danger of cutaneous absorption.

**STEL-Short Term Exposure Limit:** Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

**TLV-Threshold Limit Value:** An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

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

## HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

**HAZARD RATINGS:** This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

**HEALTH HAZARD: 0 (Minimal Hazard):** No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation:* Essentially non-irritating. PII or Draize = "0". *Eye Irritation:* Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = "0". *Oral Toxicity LD<sub>50</sub> Rat:* < 5000 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat:* < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC<sub>50</sub> Rat:* < 20 mg/L.; **1 (Slight Hazard):** Minor reversible injury may occur; slightly or mildly irritating. *Skin Irritation:* Slightly or mildly irritating. *Eye Irritation:* Slightly or mildly irritating. *Oral Toxicity LD<sub>50</sub> Rat:* > 500-5000 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* > 1000-2000 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 4-hrs Rat:* > 2-20 mg/L.; **2 (Moderate Hazard):** Temporary or transitory injury may occur. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation:* Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD<sub>50</sub> Rat:* > 50-500 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* > 200-1000 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 4-hrs Rat:* > 0.5-2 mg/L.; **3 (Serious Hazard):** Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation:* Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation:* Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD<sub>50</sub> Rat:* > 1-50 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* > 20-200 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 4-hrs Rat:* > 0.05-0.5 mg/L.; **4 (Severe Hazard):** Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation:* Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation:* Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD<sub>50</sub> Rat:* ≤ 1 mg/kg. *Dermal Toxicity LD<sub>50</sub> Rat or Rabbit:* ≤ 20 mg/kg. *Inhalation Toxicity LC<sub>50</sub> 4-hrs Rat:* ≤ 0.05 mg/L).

**FLAMMABILITY HAZARD: 0 (Minimal Hazard-Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.); 1 (Slight Hazard-Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur. Including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class IIIB, or; Most ordinary combustible materials [e.g. wood, paper, etc.]; 2 (Moderate Hazard-Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air, including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors.); 3 (Serious Hazard- Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]; 4 (Severe Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric].)**

**PHYSICAL HAZARD: 0 (Water Reactivity. Materials that do not react with water. Organic Peroxides:** Materials that are normally stable, even under fire conditions and will not react with water. *Explosives:* Substances that are Non-Explosive. *Unstable Compressed Gases:* No Rating. *Pyrophorics:* No Rating. *Oxidizers:* No "0" rating allowed. *Unstable Reactives:* Substances that will not polymerize, decompose, condense or self-react.);

## HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

### HAZARD RATINGS (continued):

**PHYSICAL HAZARD (continued): 1 (Water Reactivity. Materials that change or decompose upon exposure to moisture. Organic Peroxides:** Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives:* Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases:* Pressure below OSHA definition. *Pyrophorics:* No Rating. *Hazards:* Packaging Group III; *Solids:* any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. *Liquids:* any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives:* Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.); **2 (Water Reactivity. Materials that may react violently with water. Organic Peroxides:** Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives:* Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases:* Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics:* No Rating. *Oxidizers:* Packing Group II *Solids:* any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. *Liquids:* any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%/cellulose mixture and the criteria for Packing Group I are not met. *Unstable Reactives:* Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3 (Water Reactivity. Materials that may form explosive reactions with water. Organic Peroxides:** Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives:* Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases:* Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics:* No Rating. *Oxidizers:* Packing Group I *Solids:* any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. *Liquids:* Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%/cellulose mixture. *Unstable Reactives:* Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.); **4 (Water Reactivity. Materials that react explosively with water without requiring heat or confinement. Organic Peroxides:** Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. *Explosives:* Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. *Compressed Gases:* No Rating. *Pyrophorics:* Add to the definition of Flammability "4". *Oxidizers:* No "4" rating. *Unstable Reactives:* Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.).

### NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

**HEALTH HAZARD: 0 (materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials):** Gases and vapors whose LC<sub>50</sub> for acute inhalation toxicity is greater than 10,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 200 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 2000 mg/kg. Materials whose LD<sub>50</sub> for acute oral toxicity is greater than 2000 mg/kg. Materials that are essentially non-irritating to the respiratory tract, eyes and skin. **1 (materials that, under emergency conditions, can cause significant irritation):** Gases and vapors whose LC<sub>50</sub> for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials whose LD<sub>50</sub> for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg. Materials that cause slight to moderate irritation to the respiratory tract, eyes and skin. **2 (materials that, under emergency conditions, can cause temporary incapacitation or residual injury):** Gases and vapors whose LC<sub>50</sub> for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD<sub>50</sub> for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC<sub>50</sub> for acute inhalation toxicity, if its LC<sub>50</sub> is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. *Compressed liquefied gases* with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause severe tissue damage, depending on duration of exposure. Materials that are respiratory irritants. Materials that cause severe, but reversible irritation to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers. **3 (materials that, under emergency conditions, can cause serious or permanent injury):** Gases and vapors whose LC<sub>50</sub> for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD<sub>50</sub> for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg.



## DEFINITIONS OF TERMS (Continued)

### NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

**HEALTH HAZARD (continued): 3 (continued):** Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC<sub>50</sub> for acute inhalation toxicity, if its LC<sub>50</sub> is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. 4 (materials that, under emergency conditions, can be lethal): Gases and vapors whose LC<sub>50</sub> for acute inhalation toxicity less than or equal to 1,000 ppm. Dusts and mists whose LC<sub>50</sub> for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD<sub>50</sub> for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD<sub>50</sub> for acute oral toxicity is less than or equal to 5 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC<sub>50</sub> for acute inhalation toxicity, if its LC<sub>50</sub> is less than or equal to 1000 ppm.

**FLAMMABILITY HAZARD: 0** Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand: Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. 1 Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur: Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the UN *Recommendation on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed up flash point of the solvent. Most ordinary combustible materials. 2 Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 3 Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 4 Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily: Flammable gases. Flammable cryogenic materials. Any liquid or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

### NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

**INSTABILITY HAZARD: 0** Materials that in themselves are normally stable, even under fire conditions: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. 1 Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. 2 Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. 3 Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. 4 Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures.

### FLAMMABILITY LIMITS IN AIR:

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

### 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<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - 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<sup>3</sup>** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

### ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. **TL<sub>m</sub>** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K<sub>ow</sub>** or **log K<sub>oc</sub>** and is used to assess a substance's behavior in the environment.

### REGULATORY INFORMATION:

#### U.S. and CANADA:

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

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