



Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS 2015 (HPR-GHS) and the Global Harmonization Standard

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 PRODUCT IDENTIFIER

Trade Name (As Labeled): Master Brewers Standard Brewery Acid Tank Wash by Draftec®
Chemical Name/Class: Phosphoric Acid Solution
Relevant Use of the Product: Brewery Tank Cleaner

1.2 MANUFACTURER of the PRODUCT (for Applied Cleaning Technologies, Inc.)

Supplier/Manufacturer's Name: HIGLEY INDUSTRIES, INC.
Address: 585 Huff Street, Dubuque, IA 52003

1.3 SUPPLIER of the PRODUCT and SAFETY DATA SHEET

Supplier/Manufacturer's Name: APPLIED CLEANING TECHNOLOGIES, INC.
Address: 5815 North 82nd Street
Scottsdale, AZ 85250
Business Phone: 1-888-226-8228 (Monday-Friday 8:00 a.m. to 4:00 p.m. MST)
Emergency Phone: 1-800-424-9300 (CHEMTREC) 24-hours
[U.S., Canada, Puerto Rico, U.S. Virgin Islands]
+1-703-527-3887 (CHEMTREC) 24-hours [International] CALL COLLECT
Website: www.draftec.com
EMAIL: info@draftec.com

1.4 SDS PREPARATION and REVISION DATES

Date of Preparation: November 18, 2018
Date of Revision: March 5, 2023

NOTE: ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, Canadian WHMIS 2015 and the Global Harmonization-required information is included in appropriate sections based on the Global Harmonization Standard format. This product has been classified in accordance with the hazard criteria of the countries listed above and the SDS contains all the information required by the Canadian WHMIS 2015 [HPR-GHS], the Global Harmonization Standard and OSHA 1910.120.

2. HAZARD IDENTIFICATION

2.1 GLOBAL HARMONIZATION STANDARD CLASSIFICATION:

2.1.2 Classification: Corrosive to Metals Category 1. Skin Corrosion Category 1A

2.1.3 Hazard Statements: H290: May be corrosive to metals. H314: Causes severe skin burns and eye damage.

2.1.3 Signal Word: Danger

2.1.4 Precautionary Statements:

Prevention: P234: Keep only in original container. P260: Do not breathe mist, vapors or spray. P264 + P265: Wash hands and other contamination areas thoroughly after handling. Do not touch eyes. P270: Do not eat, drink or smoke when using this product. P273: Avoid release to the environment. P280: Wear protective gloves, clothing, eye protection and face protection.

Response: P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P302 + P361 + P354: IF ON SKIN: Take off immediately all contaminated clothing. Immediately wash with water for 15 minutes. P362 + P364: Take off contaminated clothing and wash it before reuse. P304 + P340: If inhaled, remove victim to fresh air and keep at rest in a position comfortable for breathing. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. P316: Get emergency medical help immediately. P321: Specific treatment (remove from exposure and treat symptoms). P390: Absorb spillage to prevent material damage.

Storage: P405: Store locked up. P406: Store in corrosion resistant container with resistant inner liner.

Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

2.1.5 Hazard Symbols: GHS05



EMERGENCY OVERVIEW: Product Description: This product is a clear, corrosive liquid and has a slightly pungent odor.
Health Hazards: This solution can irritate, redden, and burn exposed tissue (depending on the duration of exposure). Repeated low-level skin contact may cause dermatitis, dry, red or cracked skin. Direct eye contact may cause tissue damage or blindness. Eye exposure to fumes or mists may cause moderate to severe eye irritation. Harmful or fatal if swallowed. Inhalation of mists, sprays or fumes from the product may cause respiratory irritation. Repeated, low-level inhalation exposure may cause reduced lung function. Severe inhalation or ingestion may be fatal. Contains very trace amounts of compounds that have mutagenic, carcinogenic and reproductive toxicity effects. **Flammability Hazards:** Though this product is not flammable, if involved in a fire, it can decompose to release nitrogen, carbon, phosphorus and sulfur oxides, and acidic, corrosive vapors. **Reactivity Hazards:** This product can react with many metals to produce hydrogen gas.
Environmental Hazards: This product may cause harm to plants and animals if released to the environment. **Emergency Response Considerations:** In the event of fire or spill, adequate precautions must be taken. Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	LABEL ELEMENTS GHS Classification under U.S. OSHA Hazard Communication Standard & Canadian WHMIS (HPR-GHS) 2015 Hazard Statements
Phosphoric Acid	7664-38-2	75-85%	HARMONIZED CLASSIFICATION - ANNEX VI OF REGULATION (EC) NO 1272/2008 (CLP REGULATION) Classification: Skin Corrosion Cat. 1A Hazard Statements: H314: Causes severe skin burns and eye damage. ADDITIONAL EU ECHA NOTIFIED CLASSIFICATION Classification: Corrosive to Metals Cat. 1 Hazard Statements: H290: May be corrosive to metals.
Proprietary Surfactant Blend		< 1%	MFG CLASSIFICATION Classification: Eye Corrosion/Damage Cat. 1A, Corrosive to Metals Cat. 1 Hazard Statements: H318: Causes serious eye damage. H290: May be corrosive to metals.
Water and other trace ingredients that do not add to product hazards		Balance	Classification: Not Applicable

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST-AID MEASURES

4.1 PROTECTION OF FIRST AID RESPONDERS: RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS MATERIAL WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. Rescuers should be taken for medical attention, if necessary. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

4.2 DESCRIPTION OF FIRST AID MEASURES: Victim(s) must be taken for medical attention. Take copy of label and SDS to physician or other health professional with victim(s). Remove victim(s) to fresh air, as quickly as possible.

4.2.1 Skin Exposure: Carefully remove contaminated clothing. If contact with the product results in adverse effect, flush affected area with water. Minimum flushing is for 15 minutes. The contaminated individual must seek medical attention if any adverse effects occur after flushing.

4.2.2 GHS Precautionary Statements for Skin Exposure: P302 + P361 + P354: IF ON SKIN: Take off immediately all contaminated clothing. Immediately wash with water for 15 minutes. P362 + P364: Take off contaminated clothing and wash it before reuse.

4.2.2 Eye Exposure: If this product contaminates the eyes, rinse eyes under gently running water. Use sufficient force to open eyelids and then "roll" eyes while flushing. Minimum flushing is for 20 minutes. Seek immediate medical attention.

4.2.3 GHS Precautionary Statements for Skin Exposure: P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. P316: Get emergency medical help immediately.

4.2.3 Inhalation: If vapors of this product are inhaled, causing irritation, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect continues after removal to fresh air.

4.2.4 GHS Precautionary Statements for Skin Exposure: P304 + P340: If inhaled, remove victim to fresh air and keep at rest in a position comfortable for breathing. P316: Get emergency medical help immediately.

4.2.4 Ingestion: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain immediate medical attention.

4.2.5 GHS Precautionary Statements for Skin Exposure: P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P316: Get emergency medical help immediately.

4.3 MOST IMPORTANT SYMPTOMS and EFFECTS, WHETHER ACUTE OR DELAYED: See Sections 2 (Hazard Information) and 11 (Toxicological Information) for additional information.

4.3.1 Acute: Moderate to severe irritation or burns by all routes. All potential effects are dependent on concentration and duration of exposure.

4.3.1.2 Symptoms/Effects After Inhalation: EXPOSURE TO HIGH CONCENTRATIONS: Coughing, moderate to severe respiratory irritation, burns to nasal system, throat and airways, difficulty breathing, wheezing. Onset of reactive airways dysfunction syndrome (RADS).

4.3.1.3 Symptoms/Effects After Skin Contact: Moderate to severe irritation or burns.

4.3.1.4 Symptoms/Effects After Eye Contact: Moderate to severe irritation or burns or possible blindness.

4.3.1.5 Symptoms/Effects After Ingestion: Moderate to severe irritation or burns to mouth, throat and digestive system. May cause bloody stool. Ingestion of large quantity may be fatal.

4.3.2 Chronic: Chronic, low level exposure by all routes may cause long-term or permanent tissue damage. All potential effects are dependent on concentration and duration of exposure.

4.3.2.1 Symptoms/Effects After Skin Contact: Scarring.

4.3.2.2 Symptoms/Effects After Eye Contact: Damaged eyesight, adverse effects to tear duct, loss of vision, scarring.

4.3.2.3 Symptoms/Effects After Accidental Ingestion: Unknown.

4.3.2.4 Symptoms/Effects After Inhalation: Chronic inhalation of vapors, mists or sprays can cause reduced lung function, emphysema, reactive airways dysfunction syndrome (RADS).

4.4 MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin or respiratory conditions may be aggravated by repeated exposure to this product.

4.5 IMPORTANT SYMPTOMS AND EFFECTS: See Sections 3 (Hazard Identification) and 11 (Toxicological Information).

4.5 IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED: Treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

5.1 FLASH POINT: Not flammable.

5.2 AUTOIGNITION TEMPERATURE: Not applicable.

5.3 FLAMMABLE LIMITS (in air by volume, %): Not applicable.

5.4 FIRE EXTINGUISHING MEDIA: In the event of a fire, use suppression media for surrounding materials (e.g., water spray, dry chemical, carbon dioxide, foam, any "ABC" class extinguisher).

5.5 UNSUITABLE FIRE EXTINGUISHING MEDIA: None known.

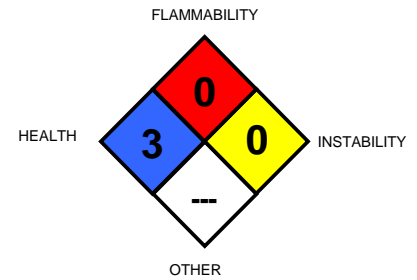
5.6 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE: This product is corrosive and presents a significant contact hazard to firefighters. This product is not flammable; however, contact with some common metals will cause generation of flammable hydrogen gas. When involved in a fire, this material may decompose and produce acidic, corrosive vapors and toxic gases (e.g., carbon, nitrogen, phosphorus and sulfur oxides).

5.6.1 Explosion Sensitivity to Mechanical Impact and Static Discharge: Not sensitive.

5.7 SPECIAL PROTECTIVE ACTIONS FOR FIRE-FIGHTERS: Prevent the spread of any released product. 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. Move fire-exposed containers of this product out of area if it can be done without risk to firefighters. If this product is involved in a fire, fire runoff water should be contained to prevent possible environmental damage.

5.7.1 GHS Precautionary Statements for Fire Response: None applicable.

NFPA RATING



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

6. ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES: In the event of a spill, clear the area and protect people. Trained personnel using pre-planned procedures should respond to uncontrolled releases. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Use water spray to reduce vapors or divert vapor cloud drift, if applicable. Call CHEMTREC (1-800-262-8200) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666). 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).

6.2 PERSONAL PROTECTIVE EQUIPMENT:

6.2.1 Small Spills: For incidental spills (less than 1 liter), wear gloves, goggles, apron and appropriate respirator for acidic liquids.

6.2.2 Large Spills: For large spills (more than 1 liter), protective apparel should be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), Tyvek or other protective clothing and boots, hard hat, and Self-Contained Breathing Apparatus.**

6.3 METHODS FOR CLEANUP AND CONTAINMENT:

6.3.1 Small Spills: Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with neutralizing agent appropriate for acidic materials. Neutralizing spill with sodium bicarbonate, sodium carbonate or calcium carbonate may produce large amounts of carbon dioxide gas.

6.3.2 Large Spills: Neutralize residue with neutralizing agent appropriate for acidic materials. Neutralizing a large spill with sodium bicarbonate, sodium carbonate or calcium carbonate will produce large amounts of carbon dioxide gas. For large spills, dike or otherwise contain spill and remove with vacuum truck or pump to storage/salvage vessels.

6.3.3 All Spills: Decontaminate the area thoroughly. Neutralize residue with neutralizing agent appropriate for acidic materials. Neutralizing spill with sodium bicarbonate, sodium carbonate or calcium carbonate will produce large amounts of carbon dioxide gas. Ensure adequate ventilation. Test area with litmus paper to ensure neutralization is complete. Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Place all spill residue in a suitable container and seal. Place all spill residue in appropriate containment and seal. Do not mix with wastes from other materials. Monitor area for hazardous levels of components and confirm 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. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). Dispose of recovered material and report spill per regulatory requirements.

6.3.4 GHS Statements for Environmental Precautions: P390: Absorb spillage to prevent material damage.

6.4 ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewer or confined spaces, waterways, soil or public waters. Do not flush to sewer.

6.4.1 GHS Statements for Environmental Precautions: P273: Avoid release to the environment.

7. HANDLING and STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING: Employees must be trained to properly use this product. As with all chemicals, avoid getting this product ON YOU or IN YOU. Ensure product is properly labeled. Do not eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product or equipment and containers that contain this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately. Keep container tightly closed when not in use. Empty containers may contain residual liquid or vapors; therefore, empty containers should be handled with care. Never store food, feed, or drinking water in containers that held this product. If this product is transferred into another container, only use portable containers and dispensing equipment (faucet, pump, drip can) approved for corrosive, acidic liquids.

When using this product, open valves on pipelines and other production equipment that contains this product slowly. Periodically inspect totes or tanks of this product for leaks or damage. Perform routine maintenance on all process equipment.

7. HANDLING and STORAGE (Continued)

7.1 PRECAUTIONS FOR SAFE HANDLING (continued):

7.1.1 GHS Statements for Safe Handling: P234: Keep only in original container. P260: Do not breathe mist, vapors or spray. P264 + P265: Wash hands and other contamination areas thoroughly after handling. Do not touch eyes. P270: Do not eat, drink or smoke when using this product. P280: Wear protective gloves, clothing, eye protection and face protection.

7.2 CONDITIONS FOR SAFE STORAGE AND ANY INCOMPATIBILITIES:

7.2.1 For Non-Bulk Containers: Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Storage areas should be made of corrosion resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate.

7.2.2 Bulk Containers: All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks promptly.

7.2.3 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, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected prior to each use. 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 operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

7.2.4 Incompatibilities: Strong acids, strong oxidizers, strong bases, metals, water reactive materials, many other organic and inorganic compounds; see Section 10 (Stability and Reactivity) for more detailed information on incompatible materials.

7.2.4.1 GHS Statements for Storage: P405: Store locked up. P406: Store in corrosion resistant container with resistant inner liner.

7.3 SPECIFIC END USE(S): This product is used as an acidic brewery tank cleaner. Follow all industry standards for use of this product.

7.4 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. Always use this product in areas where adequate ventilation is provided. Before maintenance begins, decontaminate equipment with acid neutralizing agent and follow with a triple-rinse with water. Test equipment with litmus paper to ensure neutralization is complete. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

8.1 EXPOSURE LIMITS/CONTROL PARAMETERS:

8.1.1 VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. If necessary, vent material to outside, taking appropriate precautions to prevent environmental contamination. Ensure eyewash/safety shower stations are available near where this product is used.

8.1.2 WORKPLACE EXPOSURE LIMITS:

CHEMICAL NAME	CAS#	EXPOSURE LIMITS IN AIR							OTHER mg/m ³
		ACGIH-TLVs		OSHA-PELs		NIOSH-RELs		NIOSH	
		TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	TWA mg/m ³	STEL mg/m ³	IDLH mg/m ³	
Phosphoric Acid	7664-38-2	1	3	1	3 (Vacated 1989 PEL)	1	3	1000	DFG MAKs: TWA = 2 (inhalable fraction) PEAK = 2•MAK, 15 min. average value, 1-hr interval, 4 per shift DFG MAK Pregnancy Risk Classification: C
Proprietary Surfactant		NE	NE	NE	NE	NE	NE	NE	AIHA WEELs: TWA = 10

NE = Not Established.

See Section 16 for Definitions of Other Terms Used

8.1.3 ACGIH Biological Exposure Indices (BEIs): Currently, no ACGIH Biological Exposure Indices (BEIs) have been determined for the components of this product.

8.2 PERSONAL PROTECTIVE EQUIPMENT: The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), 29 CFR 1910.133 for eye protection, 29 CFR 1910.138 for hand protection, 29 CFR 1910.136 for foot protection, or equivalent standards of Canada (including CSA Standard Z94.4-02, CSA Standard Z94.3-02, CSA Standard Z94.4-93 for respiratory protection, CSA Standard Z94.3-M1982, *Industrial Eye and Face Protectors* and CSA Standard Z195-M1984, *Protective Footwear*). Please reference applicable regulations and standards for relevant details.

8.2.1 Respiratory Protection: Maintain airborne contaminant concentrations below exposure limits listed in this section. If during use and handling, sprays mists or fumes are generated, use respiratory protection as indicated below. Due to corrosivity of this product, it is suggested that periodic monitoring should be performed to determine presence of Phosphoric Acid fumes, mists or sprays. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), equivalent U.S. State standards or the Canadian CSA Standard Z94.4-02. 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).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

8.2 PERSONAL PROTECTIVE EQUIPMENT (continued):

8.2.1 Respiratory Protection (continued): The following NIOSH respiratory protection equipment guidelines are given to assist in selection of adequate respiratory protection.

Phosphoric Acid

Concentration

Up to 25 mg/m³:

Up to 50 mg/m³:

Up to 1000 mg/m³:

Emergency or Planned

Respiratory Protection

Any Supplied-Air Respirator (SAR) operated in a continuous-flow mode.

Any Air-Purifying, Full-Facepiece Respirator with a high-efficiency particulate filter, or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece, or any SAR with a full facepiece.

Any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Entry Into Unknown Concentrations or IDLH Conditions: Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any SAR that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode

Escape:

Any Air-Purifying, Full-Facepiece Respirator with a high-efficiency particulate filter, or any appropriate escape-type, SCBA.

8.2.2 Eye Protection: Splash goggles or safety glasses. Face shields recommended when using quantities of this solution in excess of 1 gallon. In the presence of mists, fumes or sprays of the product, a face shield must be used. If necessary, refer to appropriate U.S. and Canadian Standards.

8.2.3 Hand Protection: Wear neoprene or vinyl gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this SDS. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

8.2.4 Body Protection: Use body protection appropriate for task. An apron or other impermeable body protection is suggested. Full-body chemical protective clothing is recommended for emergency response procedures. 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-M1984, *Protective Footwear*.

9. PHYSICAL and CHEMICAL PROPERTIES

9.1 MOLECULAR FORMULA: Mixture

9.2 MOLECULAR WEIGHT: Mixture

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

9.4 EVAPORATION RATE (n-BuAc=1): Not established.

9.5 SPECIFIC GRAVITY (water = 1) @ 20°C: 1.310-1.350

9.6 FREEZING/MELTING POINT: Not established.

9.7 BOILING POINT: 100°C (212°F)

9.8 SOLUBILITY IN WATER: Completely soluble.

9.9 VAPOR PRESSURE, mm Hg @ 20°C: Not established.

9.10 pH: 1

9.11 ODOR THRESHOLD: Not established.

9.12 LOG WATER/OIL DISTRIBUTION COEFFICIENT: Not established.

9.13 APPEARANCE, ODOR AND COLOR: This clear liquid that has a slightly pungent odor.

9.14 HOW TO DETECT THIS SUBSTANCE (identification properties): Litmus paper will turn red upon contact with this solution.

10. STABILITY and REACTIVITY

10.1 CHEMICAL STABILITY: Stable. Contact with phosphides, acetylides, silicides and carbides may cause formation of toxic, corrosive and/or flammable gases such as hydrogen fluoride, hydrogen cyanide, hydrogen sulfide, ammonia, phosphine and acetylene. Contact with metal powders or metal sheets of aluminum, iron, zinc, steel, copper, brass, magnesium and tin may form hydrogen gas.

10.2 DECOMPOSITION PRODUCTS:

10.2.1 Combustion: Thermal decomposition will generate phosphorus and carbon oxides, and acidic vapors.

10.2.2 Hydrolysis: None known.

10.3 MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Phosphoric acid can react strongly or violently with many compounds, including strong caustics, strong oxidizing agents, reducing agents or organic peroxides, azo compounds, epoxides, aldehydes and other polymerizable compounds, metal powders or sheets of aluminum, iron, zinc, steel, copper, brass, magnesium and tin), fluorides, halogenated organics, cyanides, sulfides, mercaptans, nitrides, metal phosphides, acetylides, silicides and carbides, nitromethane, sodium borohydride or other tetrahydroborates, alcohols, glycols, amides, amines, carbamates, esters, ketones, phenols and cresols, organophosphates, unsaturated halides.

10.4 HAZARDOUS POLYMERIZATION: Will not occur.

10.5 CONDITIONS TO AVOID: Contact with or exposure to incompatible materials, extreme temperatures.

11. TOXICOLOGICAL INFORMATION

11.1 SYMPTOMS OF EXPOSURE BY ROUTE OF EXPOSURE: Symptoms are dependent on concentration and duration of exposure.

11.1.1 Inhalation: If vapors, mists, or sprays of this solution are inhaled, they may cause moderate to severe pulmonary irritation, irritation of the mucus membranes, coughing, and a sore throat. Inhalation may also cause laryngitis, headache, nausea, vomiting, central nervous system depression, and adverse kidney and blood effects. Severe exposure may damage the tissues of the respiratory system and cause potentially fatal lung conditions (e.g., chemical pneumonitis and pulmonary edema). Repeated low-level inhalation exposure may result in damage to the lungs and reduced lung function.

11. TOXICOLOGICAL INFORMATION (Continued)

11.1 SYMPTOMS OF EXPOSURE BY ROUTE OF EXPOSURE (continued):

11.1.1 Inhalation (continued): Sudden onset of reactive airways dysfunction syndrome (RADS), with asthma-like symptoms can occur after an acute high-concentration exposure to corrosive gas, vapor, or fumes. Onset of symptoms of RADS occurs within 24 hours after exposure with persistence for at least 3 months. Symptoms include difficulty breathing, wheezing and persistent cough.

11.1.2 Contact with Eyes: Eye contact will cause irritation, pain, reddening, and blindness. Direct eye contact may cause damage to eye tissue blindness if contact is prolonged.

11.1.3 Contact with Skin: Depending on the duration of skin contact, skin exposure may cause reddening, discomfort, irritation, and chemical burns. Chemical burns can cause blistering of the skin and scarring. Repeated skin exposure can cause dermatitis (dry, red skin).

11.1.4 Skin Absorption: The components of this product are not known to be absorbed through intact skin.

11.1.5 Ingestion: Ingestion is not anticipated to be a significant route of occupational exposure. If this product is swallowed, it can burn and irritate the mouth, throat, esophagus, and other tissues of the digestive system. Symptoms of such exposure can include nausea, vomiting, diarrhea, bloody stool and ulceration of the gastrointestinal tract. Ingestion of large volumes of this product may be fatal.

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

11.2 DELAYED AND IMMEDIATE EFFECTS AND CHRONIC EFFECTS FROM SHORT AND LONG-TERM EXPOSURE:

In the event of exposure, the following symptoms may be observed:

11.2.1 Acute/Immediate: Depending on the duration of contact, exposure can irritate or burn the eyes, skin, mucous membranes, and any other exposed tissue. Inhalation may cause coughing and difficulty breathing and development of reactive airways dysfunction syndrome. Skin contact can cause blisters and scars. Eye contact can cause severe irritation, burns or blindness. Severe inhalation and ingestion exposure may be fatal.

11.2.2 Chronic/Delayed: Repeated skin exposure can cause dermatitis (dry, red skin). Repeated inhalation exposure may cause permanent damage to the respiratory system and reduced lung function.

11.2.3 Target Organs: ACUTE: Respiratory system, skin, eyes. CHRONIC: Skin, respiratory system.

11.3 TOXICITY DATA FOR COMPONENTS:

Toxicological data are available for Phosphoric Acid component. Due to large amount of data, only human data, irritation data, LD50-Oral Rat or Mouse, LD50 Skin-Rabbit or Rat and LC50 Inhalation Rat are given.

PHOSPHORIC ACID:

Standard Draize Test (Skin-Rabbit) 595 mg/24 hours: Severe

Standard Draize Test (Eye-Rabbit) 119 mg: Severe

LDLo (Unreported-Human) 220 mg/kg

LD₅₀ (Oral-Rat) 1530 mg/kg: Behavioral: somnolence (general depressed activity); Kidney/Ureter/Bladder: hematuria; Skin and Appendages: hair

PHOSPHORIC ACID (continued):

LD₅₀ (Skin-Rabbit) 2740 mg/kg: Behavioral: somnolence (general depressed activity), excitement

LC₅₀ (Inhalation-Rat) > 850 mg/m³/1 hour

11.4 TOXICITY DATA FOR PRODUCT:

Not tested.

11.4.1 Acute Toxicity Estimates (ATE): ATEs by route by any exposure cannot be calculated due to lack of any data by any route for any component.

11.5 REPEATED DOSE TOXICITY: Repeated dose toxicity effects are related to corrosivity. Repeated inhalation may cause respiratory system damage, reduced lung function and emphysema.





11.6 CARCINOGENIC POTENTIAL OF COMPONENTS: No component is 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.

11.7 IRRITANCY OF PRODUCT: This product is extremely irritating and/or corrosive to contaminated tissue, depending on the duration and concentration of exposure.

11.8 SENSITIZATION EFFECTS FROM PRODUCT: No component of this product is known to be a skin or respiratory sensitizer.

11.9 ENDOCRINE TOXICITY: No component is known or suspected to cause adverse effects on the endocrine system.

11.10 REPRODUCTIVE TOXICITY INFORMATION: Currently, the components of this product are not reported to cause human mutagenic, embryotoxic, teratogenic or reproductive toxicity effects.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD (BLUE)		3	
FLAMMABILITY HAZARD (RED)		0	
PHYSICAL HAZARD (YELLOW)		0	
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
			
For Routine Industrial Use and Handling Applications			

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

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

12.1 MOBILITY: This product is expected to have high mobility in soil. The following information is available Phosphoric Acid.

Phosphoric Acid: When spilled onto soil, Phosphoric Acid will infiltrate downward, the rate being greater with lower concentration because of reduced viscosity. During transport through the soil, phosphoric acid will dissolve some of the soil material, in particular, carbonate-based materials. The acid will be neutralized to some degree with adsorption of the proton and phosphate ions also possible. However, significant amounts of acid will remain for transport down toward the groundwater table. Upon reaching the groundwater table, the acid will continue to move in the direction of groundwater flow. A contaminated plume will be produced with dilution and dispersion serving to reduce the acid concentration.

12. ECOLOGICAL INFORMATION (Continued)

12.2 PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. It is expected that the components of this product will slowly degrade in the environment and form a variety of organic and inorganic materials; however, no specific information is known. The following information is available for Phosphoric Acid.

Phosphoric Acid: While acidity may be reduced readily by natural water hardness minerals, the phosphate may persist indefinitely.

12.3 BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential, but is not expected to have any bioconcentration hazard.

12.4 ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All releases to terrestrial, atmospheric and aquatic environments should be avoided. This solution can substantially lower the pH of an aquatic environment and can be extremely toxic to fish and aquatic plants. Aquatic toxicity data for Phosphoric Acid are given below.

Phosphoric Acid:

TLm (mosquito fish) 24-96 hours: 138 mg/L in turbid water at 22-24°C (conditions of bioassay not specified)

12.5 OTHER ADVERSE EFFECTS: No component of this product is known to have ozone depletion potential.

12.6 ENDOCRINE DISRUPTING PROPERTIES: No component has shown or is known to cause endocrine disrupting properties.

12.6 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

13.1 WASTE TREATMENT/DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Shipment of wastes must be done with appropriately permitted and registered transporters.

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

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

13.4 U.S. EPA WASTE NUMBER: Wastes of this material should be tested to see if they meet the criteria for D002 (Characteristic, Corrosive).

14. TRANSPORTATION INFORMATION

14.1 U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

UN Identification Number:	UN 1805
Proper Shipping Name:	Phosphoric acid solution
Hazard Class:	8
Packing Group:	III
DOT Label(s) Required:	Class 8
North American Emergency Response Guidebook Number (2020):	154

Marine Pollutant: No component of this product is designated by the Department of Transportation to be a Marine Pollutant as per 49 CFR 172.101, Appendix B.

Note: Shipments of this product may be shipped under small quantity and limited quantity exceptions as indicated under 49 CFR §173.4 and 49 CFR §173.150, if all requirements are met.

Small Quantity Exception (49 CFR §173.4): Small quantities of Class 8 material are not subjected to other requirements of the Hazardous Materials Regulations (Subchapter C) when the maximum quantity per inner receptacle is limited to 30 mL (liquids). Refer to 49 CFR 173.4 for specific information in packaging small quantity materials.

Limited Quantity Exceptions [49 CFR §173.154(b)]: Limited quantities for Class 8, Packing Group II materials have inner packagings not over 1.0 L (liquids) net capacity each, packed in strong outer packaging.

14.2 TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified as Dangerous Goods, per regulations of Transport Canada.

UN Identification Number:	UN 1805
Proper Shipping Name:	Phosphoric acid solution
Hazard Class:	8
Packing Group:	II
Hazard Label(s) Required:	Class 8
Special Provisions:	None
Explosive Limit & Limited Quantity Index:	5 L
Excepted Quantities:	E2
ERAP Index:	None
Passenger Carrying Ship Index:	None
Passenger Carrying Road or Rail Vehicle Index:	1 L
Marine Pollutant:	Not Applicable

14. TRANSPORTATION INFORMATION (Continued)

14.3 INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This product is classified as dangerous goods under rules of IATA.

UN Identification Number:	UN 1805
Proper Shipping Name:	Phosphoric acid solution
Hazard Class:	8
Packing Group:	III
Excepted Quantities:	E2
Hazard Label(s) Required:	Class 8
Passenger & Cargo Aircraft Packing Instruction:	852
Passenger & Cargo Aircraft Maximum Net Quantity/Pkg:	5 L
Passenger & Cargo Aircraft Limited Quantity Packing Instruction:	Y84
Passenger & Cargo Aircraft Limited Quantity Maximum Net Quantity/Pkg:	1 L
Cargo Aircraft Only Packing Instruction:	856
Cargo Aircraft Only Maximum Net Quantity/Pkg:	60 L
Special Provisions:	A3, A803
ERG Code:	8L

15. REGULATORY INFORMATION

15.1 UNITED STATES REGULATIONS:

15.1.2 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 Act.

15.1.3 U.S. SARA Threshold Planning Quantity (TPQ): There are no specific Threshold Planning Quantities for the components of this product. The default Federal SDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

15.1.4 U.S. SARA Hazard Categories (Section 311/312, 40 CFR 370-21): ACUTE: Yes; CHRONIC: No; FIRE: No; REACTIVE: No; SUDDEN RELEASE: No

15.1.5 U.S. TSCA Inventory Status: The components of this product are listed on the TSCA Inventory.

15.1.6 U.S. CERCLA Reportable Quantity (RQ): Phosphoric Acid = 5000 lb (2270 kg)

15.1.7 Other U.S. Federal Regulations: Not applicable.

15.1.8 California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): No components is listed on the California Proposition 65 lists.

15.2 CANADIAN REGULATIONS:

15.2.1 Canadian DSL/NDSL Inventory Status: The components of this product are listed on the DSL Inventory.

15.2.2 Other Canadian Regulations: Not applicable.

15.2.3 Canadian Environmental Protection Act (CEPA) Priority Substances Lists: No components of this product are not on the CEPA Priority Substances Lists.

15.2.4 Canadian WHMIS (HPR-GHS) 2015 Classification and Symbols: See Section 3 for information on Classification and Symbols under HPR-GHS 2015.

16. OTHER INFORMATION

16.1 REVISIONS DETAILS: July 2019: Review and up-date entire SDS for current GHS compliance for the U.S. and Canada. Up-date of GHS classification in Sections 2 and 16, based on current classification of components and information from the mfg of the Proprietary Surfactant component. Addition of Proprietary Surfactant Mfg GHS classification (Section 3). Addition of information for component of the Proprietary Surfactant with GHS classification (Section 3) and exposure Limits (Sections 8). Addition of toxicity data for the Proprietary Surfactant, as supplied by the mfg in Sections 11 and 12. Addition of carcinogenic potential classification of trace compound in the Proprietary Surfactant in Section 11. Addition of information on sensitization effects as provided by the mfg of the Proprietary Surfactant component in Section 11. March 2023: Review and up-date entire SDS to the most current GHS format and most current regulations in all Sections.

16.2 REFERENCES AND DATA SOURCES: Contact the supplier for information.

16.3 METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION: Criteria of the current Global Harmonization Standard are used to determine classification.

16.4 PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc. • PO Box 1961, Hilo, HI 96721 • (808) 969-4846

All statements, technical information and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed. **THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE.** Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risks and liability whatsoever in connection therewith. **NEITHER SELLER NOR MANUFACTURER SHALL BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, DIRECT, INCIDENTAL OR CONSEQUENTIAL, ARISING OUT OF THE USE OR THE INABILITY TO USE THE PRODUCT.**

16. OTHER INFORMATION (Continued)

16.5 DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on an SDS. 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:

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

DFG MAKs: Federal Republic of Germany Maximum Concentration Values in the workplace. Exposure limits are given as TWA (Time-Weighted Average) or PEAK (short-term exposure) values.

DFG MAK Germ Cell Mutagen Categories: **1:** Germ cell mutagens that have been shown to increase the mutant frequency in the progeny of exposed humans. **2:** Germ cell mutagens that have been shown to increase the mutant frequency in the progeny of exposed mammals. **3A:** Substances that have been shown to induce genetic damage in germ cells of human 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 that 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 that are clearly mutagenic *in vitro* and structurally related to known *in vivo* mutagens. **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.

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

WEEL: Workplace Environmental Exposure Limits from the AIHA.

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. Mechanical irritation may occur. PII or Draize = 0. *Eye Irritation:* Essentially non-irritating, minimal effects clearing in < 24 hours. Mechanical irritation may occur. Draize = 0. *Oral Toxicity LD₅₀ Rat > 5000 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit > 2000 mg/kg. Inhalation Toxicity 4-hrs LC₅₀ Rat > 20 mg/L. 1 Slight Hazard:* Minor reversible injury may occur; may irritate the stomach if swallowed; may defat the skin and exacerbate existing dermatitis. *Skin Irritation:* Slightly or mildly irritating. PII or Draize > 0 < 5. *Eye Irritation:* Slightly to mildly irritating, but reversible within 7 days. Draize > 0 ≤ 25. *Oral Toxicity LD₅₀ Rat > 500–5000 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit > 1000–2000 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat > 2–20 mg/L. 2 Moderate Hazard:* Temporary or transitory injury may occur; prolonged exposure may affect the CNS. *Skin Irritation:* Moderately irritating; primary irritant; sensitizer. PII or Draize ≥ 5, with no destruction of dermal tissue. *Eye Irritation:* Moderately to severely irritating; reversible corneal opacity; corneal involvement or irritation clearing in 8–21 days. Draize = 26–100, with reversible effects. *Oral Toxicity LD₅₀ Rat > 50–500 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit > 200–1000 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat > 0.5–2 mg/L. 3 Serious Hazard:* Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation:* Severely irritating and/or corrosive; may cause destruction of dermal tissue, skin burns, and dermal necrosis. PII or Draize > 5–8, with destruction of tissue. *Eye Irritation:* Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD₅₀ Rat > 1–50 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit > 20–200 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat > 0.05–0.5 mg/L. 4 Severe Hazard:* Life-threatening; major or permanent damage may result from single or repeated exposure; extremely toxic; irreversible injury may result from brief contact. *Skin Irritation:* Not appropriate. Do not rate as a 4, based on skin irritation alone. *Eye Irritation:* Not appropriate. Do not rate as a 4, based on eye irritation alone. *Oral Toxicity LD₅₀ Rat ≤ 1 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit ≤ 20 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat ≤ 0.05 mg/L.*

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD: 0 Minimal Hazard: Materials that will not burn in air when exposure to a temperature of 815.5°C (1500°F) for a period of 5 minutes. **1 Slight Hazard:** Materials that must be pre-heated before ignition can occur. Material requires considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur. This usually includes the following: 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 III B); and 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 with air. This usually includes the following: Liquids having a flash-point at or above 37.8°C (100°F); Solid materials in the form of coarse dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp); and Solids and semisolids (e.g. viscous and slow flowing as asphalt) 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, unreacted by ambient temperature, are readily ignited under almost all conditions. This usually includes the following: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 38°C (100°F) and those liquids having a flash point at or above 22.8°C (73°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); and 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 that will burn readily. This usually includes the following: 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); and Materials that ignite spontaneously when exposed to air at a temperature of 54.4°C (130°F) or below (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. *Compressed Gases:* No Rating. *Pyrophorics:* No Rating. *Oxidizers:* No 0 rating. *Unstable Reactives:* Substances that will not polymerize, decompose, condense, or self-react. **1 Water Reactivity:** Materials that change or decompose upon exposure to moisture. *Organic Peroxides:* Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy violently. *Explosives:* Division 1.5 & 1.6 explosives. Substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases:* Pressure below OSHA definition. *Pyrophorics:* No Rating. *Oxidizers:* Packaging Group III oxidizers; 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 explosion 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 explosives. Explosive substances where the explosive effects 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 oxidizers. 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. *Reactives:* Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential (or low risk) 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 1.3 explosives. 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 oxidizers. 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 (or moderate risk) 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 explosives. 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 (or high risk) to cause significant heat generation or explosion.

16. OTHER INFORMATION (Continued)

16.2 DEFINITIONS OF TERMS (continued)

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 with an LC₅₀ for acute inhalation toxicity greater than 10,000 ppm. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 200 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 2000 mg/kg. Materials with an LD₅₀ for acute oral toxicity greater than 2000 mg/kg. Materials essentially non-irritating to the respiratory tract, eyes, and skin. **1** Materials that, under emergency conditions, can cause significant irritation. Gases and vapors with an LC₅₀ for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials that slightly to moderately irritate the respiratory tract, eyes and skin. Materials with an LD₅₀ for acute oral toxicity greater than 500 mg/kg but less than or equal to 2000 mg/kg. **2** Materials that, under emergency conditions, can cause temporary incapacitation or residual injury. Gases with an LC₅₀ for acute inhalation toxicity greater than 3,000 ppm but less than or equal to 5,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 2 mg/L but less than or equal to 10 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 200 mg/kg but less than or equal to 1000 mg/kg. 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. Materials whose LD₅₀ for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. **3** Materials that, under emergency conditions, can cause serious or permanent injury. Gases with an LC₅₀ for acute inhalation toxicity greater than 1,000 ppm but less than or equal to 3,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Dusts and mists with an LC₅₀ for acute inhalation toxicity greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials with an LD₅₀ for acute dermal toxicity greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials corrosive to the skin. Cryogenic gases that cause frostbite and irreversible tissue damage. Compressed liquefied gases with boiling points below -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials with an LD₅₀ for acute oral toxicity greater than 5 mg/kg but less than or equal to 50 mg/kg. **4** Materials that, under emergency conditions, can be lethal. Gases with an LC₅₀ for acute inhalation toxicity less than or equal to 1,000 ppm. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than ten times its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 1000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD₅₀ for acute oral toxicity is less than or equal to 5 mg/kg.

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 of NFPA 704. **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 of NFPA 704. Liquids, solids, and semisolids having a flash point at or above 93.4°C (200°F) (e.g., 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 *Recommendations 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% 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 the 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). Most ordinary combustible materials. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **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) (e.g., 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 with 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% 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 (100°F) (e.g., 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 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% 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):

FLAMMABILITY HAZARD (continued): 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) (e.g., Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions. Materials that have an 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 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 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 are sensitive to localized thermal or mechanical shock 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.

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 vapor to form an ignitable mixture with air near the surface of the liquid or within the test vessel used.

Autoignition Temperature: Minimum temperature of a solid, liquid, or gas required to initiate or cause self-sustained combustion in air with no other source of ignition. **LEL:** Lowest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame. **UEL:** Highest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame.

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. **LD₅₀:** Lethal Dose (solids & liquids) that kills 50% of the exposed animals. **LC₅₀:** Lethal Concentration (gases) that kills 50% of the exposed animals. **ppm:** Concentration expressed in parts of material per million parts of air or water. **mg/m³:** Concentration expressed in weight of substance per volume of air. **mg/kg:** Quantity of material, by weight, administered to a test subject, based on their body weight in kg. **TDLo:** Lowest dose to cause a symptom. **TCLo:** Lowest concentration to cause a symptom. **TD₀, LDLo, and LD₀, or TC, TCo, LCLo, and LCo:** Lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** **IARC:** International Agency for Research on Cancer. **NTP:** National Toxicology Program. **RTECS:** Registry of Toxic Effects of Chemical Substances. 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.

REPRODUCTIVE TOXICITY INFORMATION:

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 (e.g., 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.

ECOLOGICAL INFORMATION:

EC: Effect concentration in water. **BCF:** Bioconcentration Factor, which is used to determine if a substance will concentrate in life forms that consume contaminated plant or animal matter. **TLm:** Median threshold limit. **log K_{ow}** or **log K_{oc}:** Coefficient of Oil/Water Distribution is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S.:

EPA: U.S. Environmental Protection Agency. **ACGIH:** American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. **OSHA:** U.S. Occupational Safety and Health Administration. **NIOSH:** National Institute of Occupational Safety and Health, which is the research arm of OSHA. **DOT:** U.S. Department of Transportation. **IC:** Transport Canada. **SARA:** Superfund Amendments and Reauthorization Act. **TSCA:** U.S. Toxic Substance Control Act. **CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act. Marine Pollutant status according to the DOT; CERCLA or Superfund; and various state regulations. This section also includes information on the precautionary warnings that appear on the material's package label.

CANADA:

WHMIS: Canadian Workplace Hazardous Materials Information System. **IC:** Transport Canada. **DSL/NDL:** Canadian Domestic/Non-Domestic Substances List.