1. Company and Product Identification

1.1 Identification – Product Name: RoClean P303

1.2 Other means of identification

1.3 Synonym: RoClean P303

1.4 Recommended Use Of The Chemical

1.5 Name, Address, And Telephone Number Of

1.6 The Manufacturer, Or Other Responsible Party:

Avista Technologies
140 Bosstick Street
San Marcos, CA 92069
(760) 744-0536
klindsey@avistatech.com
1-800-424-9300 (United States)
1-703-527-3887 (International Collect)

Competent Person email address
24 Hour Emergency No.: DRINKING WATER TREATMENT ADDITIVES CLASSIFIED BY NSF INTERNATIONAL TO ANSI/NSF 60 AS STANDARD DRINKING WATER TREATMENT CHEMICAL FOR USE OFF-LINE IN REVERSE OSMOSIS SYSTEMS

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white to cream-colored, corrosive solid. This product may irritate or burn contaminated tissue, depending on concentration and duration of contact. Depending on the duration of contact, over-exposures can severely irritate or cause burns to the eyes. This product is neither reactive nor flammable. Thermal decomposition of this product produces irritating vapors and toxic gases (e.g. carbon monoxide and carbon dioxide). Emergency responders must wear personal protective equipment (and have appropriate fire-extinguishing protection) suitable for the situation to which they are responding.

Physical Hazards Summary

Potential Health Hazards Summary

Potential Ecological Effects Summary

2.1 Classification Of Product

U.S. OSHA classification

Classification as per EC 1272/2008 (CLP/GHS)

WHMIS classification

None

Specific Target Organ Toxicity Single Exposure - Category 3

Skin Corrosion/Irritation - Category 1B

Eye Irritation - Category 1

Acute toxicity, Oral (Category 4)

Serious eye damage (Category 1)

Acute Hazards to the aquatic environment - Category 3

Corrosive, Skin, eye irritant

Corrosive, category 1B

Skin irritation, category 2B

Eye irritation category 2 B

Xi Irritant

E, corrosive, D2B Poisonous and infectious material - Other effects – Toxic
2.2 Label Elements OSHA/GHS

- General Warnings:
  - P101: If medical advice is needed, have product container or label at hand.
  - P102: Keep out of reach of children.
  - P103: Read label before use.
  - P403: Store in a well-ventilated place.
  - P233: Keep container tightly closed.

- Signal Word: DANGER!

- Hazard statements:
  - H302: Harmful if swallowed
  - H312: Harmful in contact with skin
  - H315 + H320: Causes skin or eye irritation
  - H319: Causes serious eye irritation
  - H314-H335: Causes severe skin burns and eye damage. May cause respiratory irritation
  - H318: Causes serious eye damage
  - H335: May cause respiratory irritation
  - H402: Harmful to aquatic life

- Precautionary statements:
  - P305: IF IN EYES, RINSE THOROUGHLY WITH RUNNING WATER
  - P338: Remove contact lenses if present and easy to do. Continue rinsing.
  - P261: Avoid breathing dust
  - P280: Wear protective gloves/protective clothing/eye protection/face protection
  - P271: Use only outdoors or in a well-ventilated area.
  - P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
  - P302/P352: If eye irritation persists: Get medical advice/attention.
  - P404: Store in a closed container.

2.3 Unclassified Hazards

None

2.4 Ingredients with unknown acute toxicity

None
3. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>% w/w</th>
<th>US OSHA</th>
<th>GHS/EU CLP</th>
<th>WHMIS</th>
</tr>
</thead>
</table>
| Organic acid  | 60-80 | Irritant| GHS: Eye Irritant Cat 2  
CLP: Xi - irritant | D2B - Poisonous and infectious material - Other effects – Toxic |
| Polyphosphate | 20-30 | Corrosive| Acute Hazards to the aquatic environment - Category 3  
Specific Target Organ   
Toxicity Single Exposure - Category 3  
Skin Corrosion/Irritation - Category 1B  
Serious Eye Damage  
Eye Irritation - Category 1 | E, Corrosive |
| Chelate       | 10-15 | Harmful by ingestion  
Irritant| Acute toxicity, Oral (Category 4)  
Serious eye damage (Category 1)  
H302 Harmful if swallowed.  
H318 Causes serious eye damage.  
P280 Wear protective gloves/eye protection/face protection.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. | E, Corrosive, D2B Poisonous and infectious material - Other effects – Toxic |
| Flow control agent | 1-5 | Dust inhalation hazard| Acute toxicity dusts & mists, category 2 | D2B - Poisonous and infectious material - Other effects – Toxic |

PRODUCT CLASSIFICATION

<table>
<thead>
<tr>
<th></th>
<th>100</th>
<th>Corrosive, skin/eye irritant</th>
</tr>
</thead>
</table>
|                  |     | Skin Corrosion/Irritation - Category 1B  
Serious Eye Damage  
Eye Irritation - Category 1  
Acute toxicity oral, Category 3  
Acute Hazards to the aquatic Environment, Category 2 | E, Corrosive  
D2B - Poisonous and infectious material - Other effects – Toxic |

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

4. FIRST-AID MEASURES

4.1 Description of Necessary Measures

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

Eye exposure: If this product enters the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek medical attention.

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

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

Immediate: Inhalation exposure may cause coughing or sneezing. Symptoms of skin and eye contact may include redness and irritation. Ingestion may cause stomach pains, cramps, and gastritis.

Delayed: Prolonged or repeated skin overexposure to this product may cause dermatitis (dry, red skin). Symptoms may include tingling, redness, and visible injury.

4.3 Indication Of Immediate Medical Attention And Special Treatment Needed, If Necessary:

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

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

5. FIRE-FIGHTING MEASURES

Flammable properties   Non-flammable aqueous solution

Flash Point °C: Not applicable.

Autoignition Temperature °C: Not applicable.

Flammable Limits (in air by volume, %):
Upper: Not applicable.
Lower: Not applicable.

5.1 Suitable And Unsuitable Extinguishing Media:

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

<table>
<thead>
<tr>
<th>Media</th>
<th>Suitable</th>
<th>Media</th>
<th>Suitable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water spray</td>
<td>YES</td>
<td>Carbon dioxide</td>
<td>YES</td>
</tr>
<tr>
<td>Foam</td>
<td>YES</td>
<td>Dry chemical</td>
<td>YES</td>
</tr>
<tr>
<td>Halon</td>
<td>YES</td>
<td>Other</td>
<td>YES</td>
</tr>
</tbody>
</table>

5.2 Specific Hazards Arising From Chemical:

When involved in a fire, this material may decompose and produce irritating fumes and toxic gases (e.g., carbon monoxide, carbon dioxide, and nitrogen oxides).

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

5.3 Special Protective Equipment And Precautions For Fire-Fighters:

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

6.1 Personal Precautions

Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people.

Protective equipment
For small releases (< 20 kg), clean up spilled powder wearing gloves, goggles, faceshield, and suitable body protection. The minimum Personal Protective Equipment recommended for response to non-incidental releases (more than 20 kg) should be Level C: triple-gloves (neoprene gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard hat, and full-face respirator with HEPA filter.

Emergency procedures
Monitoring must indicate that exposure levels are below those provided in Section 8 (Exposure Controls-Personal Protection) and that oxygen levels are above 19.5% before anyone is permitted in the area without Self-Contained Breathing Apparatus.

6.2 Methods and Materials for Containment and Cleaning Up

Moisten to suppress dust. Shovel up solids into plastic container for recovery/disposal. Neutralize residue with sodium bicarbonate or other neutralizing agent for dilute acids. Decontaminate the area thoroughly. Test area with litmus paper to ensure neutralization. Place all spill residues in a suitable plastic container. Dispose of in accordance with applicable U.S. Federal, State, or local procedures, or appropriate local standards (see Section 13, Disposal Considerations).

7. HANDLING and STORAGE

7.1 Precautions for Safe Handling

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

As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat or drink while handling this material. Avoid generating dust of this product. Remove contaminated clothing immediately.

During equipment maintenance follow practices indicated in Section 6 (Accidental Release Measures) to decontaminate equipment or clean-up small spills. Make certain that application equipment is locked and tagged-out safely if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures or appropriate local standards.

7.2 Conditions For Safe Storage

Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials. Material should be stored in secondary containers, or in a diked area, as appropriate. Storage and use areas should be covered with impervious materials. Keep container tightly closed when not in use. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

Incompatibilities
Strong acids, oxidizers

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

8.1 Control Parameters

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>% w/w</th>
<th>EXPOSURE LIMITS IN AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACGIH-TLVs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mg/m^3</td>
</tr>
<tr>
<td>Organic acid</td>
<td>Proprietary</td>
<td>60-80</td>
<td>NE</td>
</tr>
<tr>
<td>Polyphosphate</td>
<td>Proprietary</td>
<td>20-30</td>
<td>NE</td>
</tr>
<tr>
<td>Chelate</td>
<td>Proprietary</td>
<td>10-15</td>
<td>NE</td>
</tr>
<tr>
<td>Flow control agent</td>
<td>Proprietary</td>
<td>1-5</td>
<td>10</td>
</tr>
</tbody>
</table>
8.2 Appropriate Engineering Controls.  
Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in this Section or as low as reasonably achievable. Ensure eyewash/safety shower stations are available near areas where this product is used.

8.3 Personal Protective Equipment  
Respiratory protection: None needed under normal conditions of use. Use NIOSH approved respirators if ventilation is inadequate to control mists or vapor. 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 applicable local standards. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-face piece pressure/demand SCBA or a full-face piece, supplied air respirator with auxiliary self-contained air supply is required under OSHA’s Respiratory Protection Standard (1910.134-1998).

Eye protection: Use approved safety goggles or safety glasses, as described in OSHA 29 CFR 1910.133. Splash goggles with a faceshield may be needed if splash hazards exist.

Hand protection: Wear chemical impervious gloves (e.g., Solvex™, Neoprene).

Body protection: If needed, use body protection appropriate for task (e.g., Tyvek suit, rubber apron) to protect from splashes and sprays.

9. PHYSICAL and CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>This product is a white to cream-colored, corrosive solid.</td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
</tr>
<tr>
<td>Melting Point °C (°F)</td>
<td>NE</td>
</tr>
<tr>
<td>Initial Boiling Point °C (°F)</td>
<td>NE</td>
</tr>
<tr>
<td>Flammability</td>
<td>Non-flammable</td>
</tr>
<tr>
<td>Vapor Density (air = 1)</td>
<td>N/A</td>
</tr>
<tr>
<td>Solubility (in water)</td>
<td>Soluble</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Flowing solid</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>NE</td>
</tr>
<tr>
<td>How To Detect This Substance</td>
<td>Litmus paper will turn red in contact with solutions of this solid.</td>
</tr>
</tbody>
</table>

10. STABILITY and REACTIVITY

10.1 Reactivity  
Not considered reactive.

10.2 Chemical Stability  
Stable

10.3 Possibility of hazardous reactions  
Hazardous polymerization will not occur.

10.4 Conditions to avoid  
Avoid mixing with incompatible materials.

10.5 Incompatible Materials  
This product is a white to cream-colored, corrosive solid.

10.6 Hazardous Decomposition Products  
Thermal decomposition of this product may generate phosphorous oxides, carbon monoxide and carbon dioxide.
11. TOXICOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Toxicity data for hazardous ingredients</th>
<th>Oral LD₅₀, mg/kg</th>
<th>Dermal LD₅₀ mg/kg</th>
<th>Inhalation LD₅₀ mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic acid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Oral-Rat) 3 g/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Oral-Mouse) 5040 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Intraperitoneal-Rat) 883 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Subcutaneous-Rat) 5500 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Subcutaneous-Mouse) 2700 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Intraperitoneal-Mouse) 903 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Intravenous-Rabbit, adult) 330 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Intravenous-Mouse) 42 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDLo (Oral-Rabbit, adult) 7000 mg/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (dermal, rabbit) &gt; 2000 mg/kg</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>LD₅₀ (Oral-Rat) 3 g/kg</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (Oral-Mouse) 5040 mg/kg</td>
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<tr>
<td>LDLo (Oral-Rabbit, adult) 7000 mg/kg</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>LD₅₀ (dermal, rabbit) &gt; 2000 mg/kg</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

<table>
<thead>
<tr>
<th>12.1 Ecotoxicity</th>
<th>LC₅₀, mg/L</th>
<th>EC₅₀, mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>RoClean P303</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic</td>
<td>Species</td>
<td>P. promelas</td>
</tr>
<tr>
<td>Common Name</td>
<td>Fathead minnow</td>
<td>Water flea</td>
</tr>
<tr>
<td>LC₅₀ mg/L</td>
<td>854</td>
<td>325</td>
</tr>
<tr>
<td>NOEL mg/L</td>
<td>625</td>
<td>157</td>
</tr>
<tr>
<td>Duration, hrs</td>
<td>96</td>
<td>48</td>
</tr>
<tr>
<td>Terrestrial</td>
<td>NE</td>
<td>NE</td>
</tr>
</tbody>
</table>

12.2 Persistence and Degradability The components of this product decompose in soil and water.

12.3 Bioaccumulative Potential The components of this product are not expected to bioaccumulate.

12.4 Mobility in Soil When spilled onto soil, this product will infiltrate downward, the rate being greater with lower concentration because of reduced viscosity. During transport through the soil, this product will dissolve some of the soil material, in particular, carbonate-based materials.

12.5 Other Adverse Ecological Effects This product may be harmful to aquatic life if large volumes of it are released into an aquatic environment.
13. DISPOSAL CONSIDERATIONS

Preparing Wastes of this Product for Disposal

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

Disposal of Contaminated Packaging

Cleaned containers can be recycled or disposed of as non-contaminated waste, if authorized by your local authorities. Dispose of containers as required by local regulations.

U.S. EPA Waste Number

D002 (Waste Characteristic Corrosivity) for wastes consisting only of this product.

14. TRANSPORT INFORMATION

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

14.1 UN Number
UN3261

14.2 UN Proper Shipping Name
Corrosive solid, acidic, organic, n.o.s. (Citric acid)

14.3 Transport Hazard Class(es)
8 (Corrosive)

Transport label(s) required
Corrosive Class 8

14.4 Packing Group
II

14.5 Marine Pollutant
Not applicable

NA Emergency Response Guide Number (2012)
154

14.6 Transport in Bulk (Annex II of MARPOL 73/78 and IBC Code)
Not applicable

14.7 Special Transport Precautions
Not applicable

National Motor Freight Classification
#70

International Air Transport Association

14.8 UN Number
UN3261

UN Proper Shipping Name
Corrosive solid, acidic, organic, n.o.s. (Citric acid)

Transport Hazard Class(es)
8 (Corrosive)

Transport label(s) required
Corrosive Class 8

Packing Group
II

Packaging Instructions
822

International Maritime Organization

14.9 UN Number
UN3261

UN Proper Shipping Name
Corrosive solid, acidic, organic, n.o.s. (Citric acid)

Transport Hazard Class(es)
8 (Corrosive)

Transport label(s) required
Corrosive Class 8

Packing Group
II

Marine Pollutant
Not applicable

NA Emergency Response Guide Number (2012)
154

Transport in Bulk (Annex II of MARPOL 73/78 and IBC Code)
Not applicable

International Safety, Health and Environmental Regulations

15. SAFETY, HEALTH and ENVIRONMENTAL REGULATIONS
## SPECIFIC FOR THE PRODUCT

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>Organic acid</th>
<th>Polyphosphate</th>
<th>Chelate</th>
<th>Flow control agent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US EPA PROGRAMS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean Air Act Hazardous Air Pollutants</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Safe Drinking Water Act</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>RCRA F, K, P, U or D-lists</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>SARA 302 RQ</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>SARA 302 TPQ</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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<tr>
<td>SARA 313 LISTED</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td><strong>SARA CHEMICAL CATEGORIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SARA 311/312 ACUTE</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>SARA 311/312 CHRONIC</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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<tr>
<td></td>
<td>PO Box 152329</td>
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<tr>
<td></td>
<td>San Diego, CA 92195</td>
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<tr>
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<td>(858)-874-5577</td>
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**DEFINITIONS OF TERMS**
16.5 A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

### Section 2

**GHS**: Global Harmonization System  
**OSHA**: U.S. Occupational Safety and Health Administration.  
**CLP**: Classification and Packaging  
**WHMIS**: Workplace Hazardous Materials Information System  
**STOT**: Specific Target Organ Toxicity

### Section 3

**CAS #**: Chemical Abstract Service index number  
**EINECS #**: European Chemical Substances Information System index number

### Section 5

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

**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.

### Section 8

**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  
**PEL**: Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Established).  
**LD**: The lowest dose (or concentration) to cause lethal or toxic effects.  
**LDLo**: The Effect Concentration in water at which 50% of the test species if affected.  
**LCLo**: The lowest concentration to cause a symptom.  
**LDo**: LDLo, or LD, or TC, or TCo, or LCLo, or LCo, the lowest dose (or concentration) to cause lethal or toxic effects.  
**TDo**: LDLo, or LDo, or TC, or TCo, or LCLo, and LCo, the lowest dose to cause a symptom and TCLo the lowest concentration to cause a symptom;  
**BEI**: Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

### Section 11

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

### Section 12

**LC50**: The lowest concentration in water which kills 50% of the test subjects.  
**EC50**: The Effect Concentration in water at which 50% of the test species if affected.

### Section 13

**US EPA Hazardous Waste Codes**: refer to 40 CFR 261.20

### Section 14

**DOT**: US Department of Transportation  
**IATA**: International Air Transport Association  
**IMO**: International Maritime Organization  
**MARPOL**: International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978  
**IBC Code**: Merchant Shipping Code

### Section 15

**RCRA**: US Resource Conservation and Recovery Act  
**SARA**: US Superfund Amendments and Reauthorization Act  
**PSM**: US OSHA Process Safety Management  
**CFATS**: US Department of Homeland Security Chemical Facility Anti-terrorism Standard  
**DSL**: Canadian Domestic Substances List  
**NDSL**: Canadian Non-Domestic Substances List  
**REACH**: European Registration, Evaluation, Authorization and Restriction of Chemicals list  
**TSCA**: US Toxic Substances Control Act