SAFETY DATA SHEET

Synthacalk GC-2+ Activator

1. PRODUCT IDENTIFICATION

IDENTIFICATION of the SUBSTANCE or PREPARATION

<table>
<thead>
<tr>
<th>TRADE NAME (AS LABELED):</th>
<th>Pecora Synthacalk GC-2+ Activator</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT DESCRIPTION:</td>
<td>Polysulfide-Based Sealant</td>
</tr>
<tr>
<td>CHEMICAL NAME/CLASS:</td>
<td>Pigmented Polysulfide Polymer</td>
</tr>
<tr>
<td>SYNONYM(S):</td>
<td>Synthacalk GC-2+ Part A</td>
</tr>
<tr>
<td>RELEVANT USE:</td>
<td>Weather-Tight Seal Joint Caulking (Two-Part)</td>
</tr>
<tr>
<td>USES ADVISED AGAINST:</td>
<td>Other Than Relevant Use</td>
</tr>
</tbody>
</table>

COMPANY/UNDERTAKING IDENTIFICATION:

<table>
<thead>
<tr>
<th>SUPPLIER/MANUFACTURER’S NAME:</th>
<th>Pecora Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDRESS:</td>
<td>165 Wambold Road, Harleysville, PA 19438</td>
</tr>
<tr>
<td>EMERGENCY PHONE:</td>
<td>800-424-9300 (CHEMTREC, 24-hours)</td>
</tr>
<tr>
<td>BUSINESS PHONE:</td>
<td>215-723-6051 (Mon–Fri, 8 AM–5 PM ET)</td>
</tr>
</tbody>
</table>

PREPARATION DATE: January 12, 2012

REVISION DATE: May 1, 2013

This product is sold for commercial use. This MSDS has been developed to address safety concerns of those individuals working with bulk quantities of this material, as well as those of potential users of this product in industrial/occupational settings. ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, and Canadian WHMIS [Controlled Products Regulations] and the Global Harmonization Standard required information is included in appropriate sections based on the U.S. ANSI Z400.1-2008 format. This product has been classified in accordance with the hazard criteria of the countries listed above.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION: This product has been classified per GHS Standards.

   Classification: Combustible Liquid Cat. 4, Acute Oral Toxicity Cat. 4, Acute Inhalation Toxicity Cat. 4, Eye Irritation Cat. 2A, Skin Irritation Cat. 2, STOT (Central Nervous and Neurological Systems) RE Cat. 2, Skin Sensitization Cat. 1, Aquatic Acute Toxicity Cat. 1, Aquatic Chronic Toxicity Cat. 1

   Signal Word: Warning


   Hazard Symbols/Pictogram: GHS07, GHS08, GHS09

EMERGENCY OVERVIEW:

PHYSICAL DESCRIPTION: This product is a thin, black paste with a mildly sweet odor.

HEALTH HAZARDS: CAUTION! Harmful if ingested. Inhalation of fumes if heated may be harmful. Prolonged skin contact may cause irritation. May cause skin sensitization. Chronic exposure may cause damage to neurological and central nervous systems. Components are suspect carcinogens (no specific route of exposure). Limited evidence of reproductive effect from animal exposure.

FLAMMABILITY HAZARD: This product is combustible and can ignite if exposed to high temperature for a prolonged period or direct flame. If this product should be allowed to dry out, this product may exhibit the properties of a Class 1 Oxidizer. See Section 5 (Fire-Fighting Measures) for additional information.

REACTIVITY HAZARD: This product is not reactive.

ENVIRONMENTAL HAZARD: This product has not been tested for environmental impact. This product contains a compound that can cause acute and chronic aquatic toxicity and harm to terrestrial organisms.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS®)

<table>
<thead>
<tr>
<th>Health</th>
<th>2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>2</td>
</tr>
<tr>
<td>Physical Hazard</td>
<td>0</td>
</tr>
</tbody>
</table>

See Section 16 for definitions of ratings

0 = Minimal  3 = Serious
1 = Slight  4 = Severe
2 = Moderate  * = Chronic

HMIS® is a registered trademark of the National Paint and Coatings Association.

CANADIAN WHMIS CLASSIFICATION: Class D2B. See Section 15 (Regulatory Information) for all classification details.

U.S. OSHA REGULATORY STATUS: This material has a classification under the Global Harmonization Standard, as applied under OSHA regulations, as given earlier in this Section.
3. MATERIAL IDENTIFICATION

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>W/W%</th>
<th>GHS Classification Hazard Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Oxide</td>
<td>1313-13-9</td>
<td>50.0-60.0</td>
<td>Classification: Acute Oral Toxicity Cat. 4, Acute Inhalation Toxicity Cat. 4 Hazard Statement Codes: H302 + H332</td>
</tr>
<tr>
<td>Tetramethylthiuram Disulfide</td>
<td>137-26-8</td>
<td>1.0–3.0</td>
<td>Classification: Combustible Liquid Cat. 4, Acute Oral Toxicity Cat. 4, Acute Inhalation Toxicity Cat. 4, STOT (Central Nervous System, Brain) RE Cat. 2, Skin Irritation Cat. 2, Eye Irritation Cat. 2A, Skin Sensitization Cat. 1, Aquatic Acute Toxicity Cat. 1, Aquatic Chronic Toxicity Cat. 1 Hazard Statement Codes: H227, H302 + H332, H373, H315, H319, H317, H400, H410</td>
</tr>
<tr>
<td>Other components. Each of the other components is present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens) or is considered to be non-hazardous.</td>
<td>Balance</td>
<td>Classification: Not Applicable</td>
<td></td>
</tr>
</tbody>
</table>

See Section 16 for full text of classification

4. FIRST-AID MEASURES

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.

DESCRIPTION OF FIRST AID MEASURES: Remove victim(s) to fresh air, as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Remove and isolate contaminated clothing and shoes. Seek immediate medical attention. Take copy of label and MSDS to physician or other health professional with victim(s).

INHALATION: If dusts of this material are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

SKIN EXPOSURE: If the material contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 20 minutes. Do not interrupt flushing. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention.

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 20 minutes. Do not interrupt flushing.

INGESTION: If this material is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directly by medical personnel. Have victim rinse mouth with water or give several cupsfuls of water, if conscious. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Central nervous or neurological system, dermatitis or other pre-existing skin disorders may be aggravated by overexposures to this product.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: > 60°C (> 140°F)

FLAMMABLE LIMITS IN AIR: Unknown.

EXTINGUISHING MEDIA:

SUITABLE EXTINGUISHING MEDIA: Use extinguishing material suitable to the surrounding fire, including foam, halon, carbon dioxide and dry chemical.

UNSUITABLE EXTINGUISHING MEDIA: None known.

PROTECTION OF FIREFIGHTERS:

SPECIAL HAZARDS ARISING FROM THE SUBSTANCE: This product is combustible and can be ignited when exposed to its flashpoint. Not sensitive to mechanical impact under normal conditions. Not sensitive to static discharge under normal conditions. Closed containers may develop pressure and rupture in event of fire. Should this product be allowed to dry out, it may present hazards of a Class 1 Oxidizer (any material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials) and does not moderately increase the burning rate of combustible materials with which it comes into contact.

SPECIAL PROTECTIVE ACTIONS 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

PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES: An accidental release can result in a fire. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. Use only non-sparking tools and equipment during the response. The atmosphere must at least 19.5 percent Oxygen before non-emergency personnel can be allowed in the area without Self-Contained Breathing Apparatus and fire protection.
### 6. ACCIDENTAL RELEASE MEASURES (Continued)

**PERSONAL PROTECTIVE EQUIPMENT:** Responders should wear the level of protection appropriate to the type of chemical released, the amount of the material spilled, and the location where the incident has occurred.

**Small Spills:** For releases of 1 drum or less, Level D Protective Equipment (gloves, chemical resistant apron, boots, and eye protection) should be worn.

**Large Spills:** Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit, fire-retardant clothing and boots, hard hat, and Self-Contained Breathing Apparatus.**

**METHODS FOR CLEAN-UP AND CONTAINMENT:**

**All Spills:** Access to the spill area should be restricted. Spread should be limited by gently covering the spill with polypads. Scrape up or pick-up spilled material, placing in suitable containers. Absorb any residual on appropriate material, such as sand. All contaminated absorbents and other materials should be placed in an appropriate container and seal. Do not mix with wastes from other materials. 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. Remove all residue before decontamination of spill area. Clean spill area with soap and copious amounts of water.

**ENVIRONMENTAL PRECAUTIONS:** Minimize use of water to prevent environmental contamination. Prevent spill or rinse from contaminating storm drains, sewers, soil or groundwater. Place all spill residues in a suitable container and seal. Do not discharge effluent containing this product into streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

**OTHER INFORMATION:** U.S. regulations may require reporting of spills of this material that reach surface waters if a sheen is formed. If necessary, the toll-free phone number for the US Coast Guard National Response Center is 1-800-424-8802.

**REFERENCE TO OTHER SECTIONS:** See information in Section 8 (Exposure Controls – Personal Protection) and Section 13 (Disposal Considerations) for additional information.

### 7. HANDLING and STORAGE

**PRECAUTIONS FOR SAFE HANDLING:** 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 contact with eyes, skin, and clothing. Avoid breathing fumes, dusts, vapors or mist. Do not taste or swallow. Use only with adequate ventilation. Keep away from heat and flame. In the event of a spill, follow practices indicated in Section 6: ACCIDENTAL RELEASE MEASURES.

**CONDITIONS FOR SAFE STORAGE:** This product is stable under ordinary conditions of handling, use and storage. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10: STABILITY AND REACTIVITY). Keep container tightly closed when not in use. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. To prolong shelf life, store at temperatures below 26°C (80°F).

**PRODUCT END USE:** This product is used as a sealant. Follow all industry standards for use of this product.

### 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**EXPOSURE LIMITS/CONTROL PARAMETERS:** Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below.

**VENTILATION AND ENGINEERING CONTROLS:**

**OCCUPATIONAL/WORKPLACE EXPOSURE LIMITS/GUIDELINES:**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>Guideline</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Oxide</td>
<td>1313-13-9</td>
<td>ACGIH TLV TWA</td>
<td>0.2 mg/m³ NIOSH: 0.2 mg/m³ respirable fraction; 0.2 mg/m³ inhalable fraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OSHA PEL STEL/CEIL(C)</td>
<td>Fume: 0.2 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIOSH REL TWA</td>
<td>5 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIOSH REL STEL</td>
<td>1 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIOSH IDLH</td>
<td>3 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DFG MAK TWA</td>
<td>Fume: 750 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DFG MAK PEAK</td>
<td>0.2 mg/m³ inhalable fraction, 0.02 respirable fraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;MAK 15 minute average value, 1-hr interval, 4 per shift</td>
</tr>
</tbody>
</table>

| Tetramethylthiuram Disulfide | 137-26-8 | ACGIH TLV TWA           | 0.05 mg/m³ measured as the inhalable fraction and vapor (sensitizer) |
|                             |         | OSHA PEL TWA            | 5 mg/m³                                                               |
|                             |         | NIOSH REL TWA           | 5 mg/m³                                                               |
|                             |         | NIOSH REL STEL          | 100 mg/m³                                                            |
|                             |         | NIOSH IDLH              | 1 mg/m³                                                               |
|                             |         | DFG MAK TWA             | >MAK 15 minute average value, 1-hr interval, 4 per shift             |
|                             |         | DFG OTHER               | Danger of sensitization of the skin                                   |
|                             |         | DFG PREGNANCY RISK CAT. | C                                                                     |
8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

PERSONAL PROTECTIVE EQUIPMENT (PPE) [continued]:

EYE/FACE PROTECTION: Use approved safety goggles or safety glasses. If necessary, refer to appropriate regulations and standards.

SKIN PROTECTION: Wear chemical impervious gloves (e.g., Nitrile or Neoprene). Use triple gloves for spill response. If necessary, refer to appropriate regulations and standards.

BODY PROTECTION: Use body protection appropriate for task (e.g., lab coat, coveralls, Tyvek suit). If necessary, refer to the OSHA Technical Manual (Section VII: Personal Protective Equipment) or appropriate Standards of Canada. 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 appropriate regulations and standards.

RESPIRATORY PROTECTION: If mists or sprays from this product are created during use, use appropriate respiratory protection. If necessary, use only respiratory protection authorized in appropriate regulations. 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 appropriate regulations and standards.

9. PHYSICAL and CHEMICAL PROPERTIES

FORM: Thin paste.

MOLECULAR FORMULA: Mixture.

COLOR: Black.

MOLECULAR WEIGHT: Mixture.

ODOR THRESHOLD: For Tetramethylthiuram Disulfide: 0.5 ppm

SPECIFIC GRAVITY: 1.76

RELATIVE VAPOR DENSITY (air = 1): Heavier than air.

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

SPECIFIC GRAVITY: Heavier than water.     EVAPORATION RATE (BuAc = 1): < 1

SOLUBILITY IN WATER: Insoluble.

BOILING POINT: Not established.

MELTING/FREEZING POINT: Not available.

WEIGHT % VOC: Not available.

FLASH POINT: > 60°C (> 140°F)

PH: Not available.

FLAMMABLE LIMITS (in air by volume, %): Lower: Not established; Upper: Not established.

RELATIVE VAPOR DENSITY (air = 1): Insoluble.

EVAPORATION RATE (BuAc = 1): < 1

RELATIVE VAPOR DENSITY (air = 1): lower

SPECIFIC GRAVITY: Lower

RELATIVE VAPOR DENSITY (air = 1): Not available.

OTHER SOLUBILITIES: Not available.

MELTING/FREEZING POINT: Not established.

WEIGHT % VOC: Not available.

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

HOW TO DETECT THIS SUBSTANCE (IDENTIFYING PROPERTIES): The appearance of this product may act as an identifying property in the event of an accidental release.

10. STABILITY and REACTIVITY

CHEMICAL STABILITY: Stable under normal circumstances of use and handling.

CONDITIONS TO AVOID: Avoid contact with incompatible chemicals and exposure to extreme temperatures.

INCOMPATIBLE MATERIALS: This product is not compatible with strong acids and oxidizers. Due to high concentration of Manganese Oxide, this product may also be incompatible with interhalogens (e.g. chlorine trifluoride), reducers (e.g. metals such as aluminum, lithium; metal hydrides such as lithium hydride); ammonia, ammonium salts, metal halide salts (e.g. sodium chloride, sodium bromide), Lewis acids (e.g. diboron tetrafluoride), potassium azide, hydroxylaminiumchloride, organic matter (e.g. oil, waxes, cotton, carbon), organic compounds (e.g. secondary and primary alcohols, alkenes, aldehydes, amines, saturated hydrocarbons), hydrogen sulfide, sulfur dioxide, and inorganic acids (e.g. hydrochloric acid, sulfuric acid, nitric acid).

HAZARDOUS DECOMPOSITION PRODUCTS: Combustion: Thermal decomposition of this product can generate dusts, irritating fumes, and toxic gases (e.g. manganese and sulfur oxides, carbon disulfide). Hydrolysis: None known.

POSSIBILITY OF HAZARDOUS REACTIONS/POLYMERIZATION: This product is not expected to undergo hazardous polymerization, decomposition, condensation, or self-reactivity. Due to the high concentration of Manganese Oxide, this product may react violently or in other hazardous manner with interhalogens, reducers, ammonium salts, metal halides and Lewis acids. If allowed to dry, the product may also react with organic matter to cause fire.

11. TOXICOLOGICAL INFORMATION

POSSIBILITY OF HAZARDOUS REACTIONS/POLYMERIZATION: This product is not expected to undergo hazardous polymerization, decomposition, condensation, or self-reactivity. Due to the high concentration of Manganese Oxide, this product may react violently or in other hazardous manner with interhalogens, reducers, ammonium salts, metal halides and Lewis acids. If allowed to dry, the product may also react with organic matter to cause fire.

CONTACT WITH SKIN or EYES: Contact may mildly irritate the skin and cause redness and discomfort. Prolonged or repeated skin contact may cause dermatitis (dry, red skin). May cause sensitization and allergic reaction by skin contact. Symptoms may include rash, swelling, itching and contact dermatitis. Eye contact may cause redness, pain, and tearing.

SKIN ABSORPTION: No information is available on possible hazards by skin absorption.

INGESTION: If the product is swallowed, it may mildly irritate the mouth, throat, and other tissues of the gastro-intestinal system and may cause nausea, vomiting, and diarrhea.

INHALATION: Occupational exposure to vapors of this product generated during curing, or dusts of this product generated during use after curing may mildly irritate the respiratory tract and cause coughing and sneezing. Vapors or fumes when used in an enclosed space, if heated or during curing may cause irritation of the respiratory system. Symptoms include nose irritation, dry or sore or burning throat, runny nose, shortness of breath. Chronic inhalation of dusts from dried product may result in lung injury or damage. Due to the presence of Manganese Disulfide, inhalation exposure may cause adverse effects described under 'Other Health Effects'.

INJECTION: Accidental injection of this product (e.g. puncture with a contaminated object) may cause irritation and redness, in addition to the wound.

OTHER POTENTIAL HEALTH EFFECTS: Due to the high level of Manganese Oxide, exposure to this product may cause symptoms of manganese toxicity. Effects may include adverse effects on the lungs and central nervous system, resulting in increased susceptibility to bronchitis, pneumonitis and neurologic, neuropsychiatric disorders (manganeseism). Animal tests show that Manganese Oxide possibly causes toxicity to human reproduction or development.
11. TOXICOLOGICAL INFORMATION

TARGET ORGANS: Acute: Skin, eyes, central nervous system. Chronic: Skin, respiratory system, central nervous system, neurological system, reproductive system.

CHRONIC EFFECTS: Prolonged or repeated skin contact may cause dermatitis (dry, red skin). May cause skin sensitization and allergic reaction in susceptible individuals. Chronic exposure may cause adverse effects on central nervous and neurological system, as described under ‘Other Potential Health Effects’.

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

MANGANESE OXIDE:
TCLo (Inhalation-Man) 0.66 mg/m³/14 year-intermittent: Brain and Coverings: recordings from specific areas of CNS; LDLo (Oral-Cat) 1000 mg/kg
LDLo (Intraperitoneal-Mouse) 125 mg/kg: Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue); Developmental Abnormalities: musculoskeletal system
LDLo (Oral-Rat) 3478 mg/kg
LDLo (Subcutaneous-Mouse) 422 mg/kg
LDLo (Intratracheal-Rat) 50 mg/kg: Lungs, Thorax, or Respiration: embolysma, acute pulmonary edema
LDLo (Intravenous-Rabbit) 45 mg/kg

TCLo (Inhalation-Rat) 1800 µg/m³/24 hours/35 days-continuous: Brain and Coverings: recordings from specific areas of CNS; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: true cholinesterase
TCLo (Inhalation-Man) 7 mg/m³/24 hours/34 weeks-continuous: Behavioral: alteration of classical conditioning
TCLo (Inhalation-Man) 49 mg/m³/7 hours: female 75 day(s) pre-mating 1-18 day(s) after conception: Reproductive: Effects on Newborn: growth statistics (e.g., reduced weight gain), body: unclassifiable
TCLo (Inhalation-Man) 0.6 mg/m³/1 hour/17 weeks-intermittent: Behavioral: tremor, excitement, changes in motor activity (specific assay)
TDLo (Subcutaneous-Mouse) 6000 mg/kg/12 days-intermittent: Related to Chronic Data: death
TDLo (Oral-Mammal-Species Unspecified) 848 mg/kg/12 days-intermittent: Behavioral: changes in motor activity (specific assay)

TETRAMETHYLTHIURAM DISULFIDE:
TCLo (Intraperitoneal-Rat) 120 mg/kg: Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue); Developmental Abnormalities: musculoskeletal system
LDLo (Oral-Rat) 300 mg/kg: female 6-15 day(s) after conception: Reproductive: Fertility: pre-implantation mortality (e.g. death and/or resorbed implants per total number of implants)
TDLo (Oral-Rabbit) 815 mg/kg: male 7 day(s) post-conception: Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus); Specific Developmental Abnormalities: other developmental abnormalities
TDLo (Oral-Hamster) 500 mg/kg: female 7-8 day(s) after conception: Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus), fetal death; Specific Developmental Abnormalities: other developmental abnormalities
TDLo (Oral-Dog) 2120 µg/kg: female 7 day(s) after conception: Reproductive: Specific Developmental Abnormalities: musculoskeletal system
LDLo (Oral-Rat) 3478 mg/kg
LDLo (Preliminary-Rat) 1433 mg/kg: Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue); Developmental Abnormalities: musculoskeletal system
LDLo (Oral-Rat) 210 mg/kg
LDLo (Oral-Wild Bird Species) 300 mg/kg
LDLo (Skin-Rat) > 5000 mg/kg
LDLo (Intraperitoneal-Rat) 120 mg/kg: Liver: hepatitis (hepatocellular necrosis), zonal; liver function tests impaired
LDLo (Oral-Mouse) 1250 mg/kg: Behavioral: somnolence (general depressed activity), tremor, Lungs, Thorax, or Respiration: respiratory depression
LDLo (Oral-Mouse) 560 mg/kg
LDLo (Oral-Mouse) 1250 mg/kg: Behavioral: somnolence (general depressed activity); Skin and Appendages: hair
LDLo (Oral-Mouse) 1350 mg/kg
LDLo (Oral-Rabbit) 210 mg/kg
LDLo (Oral-Rat) 1433 mg/kg: Reproductive: Specific Developmental Abnormalities: craniofacial (including nose and tongue); Developmental Abnormalities: musculoskeletal system
LDLo (Intraperitoneal-Rat) 138 mg/kg: Behavioral: changes in motor activity (specific assay); Nutritional and Gross Metabolic: body temperature decrease
LDLo (Subcutaneous-Mouse) 646 mg/kg
LDLo (Subcutaneous-Mouse) 1109 mg/kg
LDLo (Subcutaneous-Mouse) 70 mg/kg
LDLo (Unreported-Rat) 740 mg/kg
LDLo (Unreported-Mouse) 1150 mg/kg
LDLo (Unreported-Rabbit) 210 mg/kg
LDLo (Unreported-Chicken) 840 mg/kg
LDLo (Unreported-Mammal-Domestic) 225 mg/kg
LDLo (Unreported-Mammal-Species Unspecified) 400 mg/kg
LDLo (Inhalation-Rat) 4420 mg/m³/4 hours: SenseOrgans and Special Senses (Eye): lacrimation; Behavioral: somnolence (general depressed activity); Kidney/Urter/Bladder: urine volume increased
LDLo (Inhalation-Rat) 500 mg/m³/4 hours
LDLo (Oral-Cat) 230 mg/kg: Behavioral: convulsions or effect on seizure threshold, ataxia, analgesia
LDLo (Skin-Rat) 5 gm/kg: Behavioral: somnolence (general depressed activity)
LDLo (Skin-Rat) 1000 mg/kg
LDLo (Oral-Cat) 450 mg/kg/90 days-intermittent: Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: multiple enzyme effects: Related to Chronic Data: death
LDLo (Oral-Rat) 406 mg/kg/14 days-intermittent: Liver: other changes; Blood: other changes; Biochemical: Metabolism (Intermediate): lipids including transport
LDLo (Oral-Rat) 350 mg/kg/7 days-continuous: Brain and Coverings: other degenerative changes; Kidney/Urter/Bladder: other changes, changes in metals, not otherwise specified
LDLo (Oral-Rat) 10,920 mg/kg/2 years-continuous: Behavioral: food intake (animal): Musculoskeletal: other changes; Nutritional and Gross Metabolic: weight loss or decreased weight gain
LDLo (Oral-Rat) 1680 mg/kg/4 weeks-continuous: Blood: changes in erythrocyte (RBC) count; Skin and Appendages: hair; Nutritional and Gross Metabolic: weight loss or decreased weight gain
LDLo (Oral-Rat) 125 mg/kg/5 days-intermittent: Endocrine: changes in luteinizing hormone
LDLo (Oral-Rat) 387.5 mg/kg/31 days-intermittent: Endocrine: other changes
LDLo (Oral-Rat) 1550 mg/kg/31 days-intermittent: Endocrine: changes in luteinizing hormone
11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>EPA</th>
<th>IARC</th>
<th>NTP</th>
<th>NIOSH</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>PROP 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetramethylthiuram Disulfide</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NIC: A4</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

IARC 3: Unclassifiable as to Carcinogenicity in Humans. EPA-D: Not Classifiable as to Human Carcinogenicity. ACGIH TLV-A4: Not Classifiable as a Human Carcinogen.

IRRITANCY OF PRODUCT: This product may mildly irritate contaminated tissue, especially if contact is prolonged. Eye irritation may be more pronounced.

SENSITIZATION TO THE PRODUCT: This product may cause skin sensitization. The Tetramethylthiuram Disulfide component may be a skin sensitizer based on human and animal information. A positive result was obtained for Tetramethylthiuram Disulfide in the human maximization test in which 4/25 subjects showed a positive response. There are several reports of contact dermatitis in people exposed to products containing Tetramethylthiuram Disulfide. Positive results have been reported in a number of animal studies.

TOXICOLOGICAL SYNERGISTIC PRODUCTS: None known.

REPRODUCTIVE TOXICITY INFORMATION: This product has not been tested for reproductive toxicity. The following information is available for components.

Mutagenicity: The Tetramethylthiuram Disulfide component induced micronucleus formation in mouse bone marrow, chromosomal aberrations in mouse spermatoocytes and morphologically abnormal sperm in mice in vivo. A negative response was obtained in one of three studies of micronucleus formation. Tetramethylthiuram Disulfide induced marked dose related increases in aberrations (mainly chromatid exchanges and breaks) in Chinese Hamster epithelial-liver (CHEL) cells. In CHO cells, significant increases in aberration frequencies were produced only in the presence of rat S9.

Teratogenicity: The Tetramethylthiuram Disulfide component was teratogenic, causing cleft palate, skeletal malformations including micrognathia, wavy ribs, and distorted bones during the period of organogenesis in tests with rats and mice. In tests with chickens, eye defects and open coeloms have occurred.

Reproductive Toxicity: In animal tests involving the Tetramethylthiuram Disulfide component, marginal increase in the relative weight of testes and epididymis and decrease in the weight of seminal vesicle and prostate. Marked degenerative changes were observed in seminiferous tubules together with alterations in testicular enzyme profile. The activity of testicular enzymes such as ACP, SDH and ATPase (Na+K+ dependent) was decreased whereas activity of LDH, G-6-PDH and ALP increased. Other adverse effects have included abnormal sperm heads, alteration (prolongation) of the estrous cycle in association with a reduction in ovarian and uterine weights in female rats and decreased fertility in male rats. Animal tests involving the Manganese Disulfide component indicate this substance possibly causes toxicity to human reproduction or development.

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

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil. The following information is available for the Tetramethylthiuram Disulfide component.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability. The following information is available for the Tetramethylthiuram Disulfide component.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential. The following information is available for the Tetramethylthiuram Disulfide component.

Synthacalk GC-2+ Activator
Page 6 of 11
May 1, 2013
12. ECOLOGICAL INFORMATION (Continued)

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. The following data are available for the Tetramethylthiuram Disulfide component.

TETRAMETHYLTHIURAM DISULFIDE:

\[
\text{LD}_{50} (\text{Anas Platyrhynchos Mallard duck, female 3 month old}) \text{ oral, } >2800 \text{ mg/kg /sample purity } >99\%
\]

\[
\text{LD}_{50} (\text{Phasianus colchicus Ring-necked pheasant, male 3-4 months old}) \text{ oral, } 673 \text{ mg/kg (95\% confidence limit: 485-932 mg/kg) sample purity } >99\%
\]

\[
\text{LD}_{50} (\text{Apelitus phoenix Redwing blackbird}) \text{ oral, } >100 \text{ mg/kg}
\]

\[
\text{LD}_{50} (\text{Apis mellifera Honey bee}) \text{ topical 48 hours } >74 \mu g/bee
\]

\[
\text{LD}_{50} (\text{Sharnus vulgaris European starling}) \text{ oral 14 days } >100 \text{ mg/kg}
\]

\[
\text{LD}_{50} (\text{Peromyscus maniculatus Deer mouse}) \text{ oral } >750 \text{ mg/kg lw}
\]

\[
\text{LC}_{50} (\text{Phasianus colchicus Ring-necked pheasant, 10 day old}) \text{ oral, 8 days } >5000 \text{ ppm}
\]

\[
\text{LC}_{50} (\text{Coturnix japonica Japanese quail, 14 day old}) \text{ oral, 8 days } >5000 \text{ ppm}
\]

\[
\text{LC}_{50} (\text{Collinus virginianus Northern bobwhite quail, 14 day old}) \text{ oral, 8 days } =3950 \text{ ppm}
\]

\[
\text{LC}_{50} (\text{Anas Platyrhynchos Mallard duck, reduced numbers of eggs hatched, reduced survival}) \text{ 5 days } =5000 \text{ ppm}
\]

\[
\text{LC}_{50} (\text{Cyprinus carpio carp}) \text{ 4 mg/L/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Dugesia gonocephala platyhelminth}) \text{ 24 hours } =0.53 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Annelis aquaticus crustacean}) \text{ 24 hours } =1882 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Dugesia gonocephala platyhelminth}) \text{ 96 hours } =0.48 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Dugesia gonocephala platyhelminth}) \text{ 24 hours } =0.03 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Dugesia gonocephala platyhelminth}) \text{ 96 hours } =0.61 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Annelis aquaticus crustacean}) \text{ 96 hours } =61 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Xenopus laevis amphibian stage 47}) \text{ 24 hours } =0.017 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Xenopus laevis amphibian stage 47}) \text{ 96 hours } =0.0013 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Xenopus stage 53}) \text{ 24 hours } =0.025 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Lymnaea stagnalis}) \text{ 96 hours } =3.35 \text{ mg/L/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Tropidia reticulata}) \text{ 96 hours } =0.27 \text{ mg/L/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Rabohora heteromorpha Harlequin fish}) \text{ 96 hours } =0.007 \text{ mg/L/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Rabohora heteromorpha Harlequin fish}) \text{ 24 hours } =100 \text{ mg/kg/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Oncorhynthus mykiss Rainbow trout}) \text{ 48 hours } =0.13-0.23 \text{ mg/L/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Lepomis macrochirus Bluegill sunfish}) \text{ 48 hours } =0.13-0.23 \text{ mg/L/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Lepomis macrochirus Bluegill sunfish}) \text{ 96 hours } =4 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

\[
\text{LC}_{50} (\text{Crassostrea gigas Eastern oyster}) \text{ 96 hours } =4.7 \text{ ppm/Conditions of bioassay not specified in source examined}
\]

OTHER ADVERSE EFFECTS: This material is not expected to have any ozone depletion potential.

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

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: As supplied, this product would not be a hazardous waste as defined by U.S. federal regulation (40 CFR 261) if discarded or disposed. State and local regulations may differ from federal regulations. The generator of the waste is responsible for proper waste determination and management.

U.S. EPA WASTE NUMBER: May be subject to RCRA code U244 (Tetramethylthiuram Disulfide)

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: This product is NOT classified as Dangerous Goods, per U.S. DOT regulations, under 49 CFR 172.101.

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

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This product is NOT classified as dangerous goods, per the International Air Transport Association.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This product is not classified as dangerous goods, per the International Maritime Organization.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The following components of this product are subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>SECTION 302 EHS (TPQ)</th>
<th>SECTION 304 RQ</th>
<th>SECTION 313 TRI (threshold)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Oxide (-manganese compound)</td>
<td>No</td>
<td>No</td>
<td>Yes (Code N450)</td>
</tr>
<tr>
<td>Tetramethylthiuram Disulfide</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

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

U.S. TSCA INVENTORY STATUS: All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Tetramethylthiuram Disulfide = 10 lb (0.45 kg). As a manganese compound, Manganese Disulfide has no specific CERCLA RQ, but is a CERCLA Hazardous Substance.

U.S. CLEAN AIR ACT (CA 112n) THRESHOLD QUANTITY (TQ): Not applicable.

OTHER U.S. FEDERAL REGULATIONS: The Manganese Oxide component is listed as a Hazardous Air Pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Manganese Oxide is included on this list.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component is found on the Proposition 65 List of chemicals.

ADDITIONAL CANADIAN REGULATIONS:
ADDITIONAL MEXICAN REGULATIONS:

MEXICAN WORKPLACE REGULATIONS (NOM-018-STPS-2000): This product is not classified as hazardous.

16. OTHER INFORMATION

WARNINGS (per ANSI Z129.1):

WARNING! HARMFUL IF INGESTED. MAY BE HARMFUL IF FUMES OR PARTICULATES ARE INHALED. MAY CAUSE EYE, SKIN, AND RESPIRATORY TRACT IRRITATION, ESPECIALLY IF EXPOSURE IS PROLONGED. MAY CAUSE SKIN SENSITIZATION AND ALLERGIC REACTIONS IN SUSCEPTIBLE INDIVIDUALS. CHRONIC EXPOSURE MAY CAUSE ADVERSE EFFECTS TO THE CENTRAL NERVOUS SYSTEMS, CONTAINS COMPOUNDS WITH LIMITED EVIDENCE OF CARCINOGENIC AND REPRODUCTIVE EFFECTS, BASED ON ANIMAL INFORMATION. COMBUSTIBLE-MAY IGNITE IF HIGHLY HEATED FOR PROLONGED PERIOD OR IF SUBJECT TO DIRECT FLAME. CONTAINS COMPOUND THAT MAY CAUSE ACUTE AND CHRONIC HARM TO TERRESTRIAL AND AQUATIC ORGANISMS. IF ALLOWED TO DRY, MAY BECOME OXIDIZING MATERIAL.

WARNINGS (per ANSI Z129.1) [continued]: Avoid contact with eyes, skin, and clothing. Avoid breathing fumes, dusts, vapors or mist. Do not taste or swallow. Wash thoroughly after handling. Keep container tightly closed. Use only with adequate ventilation. Keep away from heat and flame. Wear gloves, eye protection, respiratory protection, and appropriate body protection. FIRST-AID: In case of contact, immediately flush skin and eyes with plenty of water. Remove contaminated clothing and shoes. Get medical attention if irritation develops or persists. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. Get medical attention. IN CASE OF FIRE: Use water fog, foam, dry chemical, or CO₂. IN CASE OF SPILL: Absorb spilled product with polyprop and other suitable absorbing material. Place all spill residue in an appropriate container and seal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations and those of Canada.

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION:

Classified in accordance with the Global Harmonization Standard.

Classification: Combustible Liquid Category 4, Acute Oral Toxicity Category 4, Acute Inhalation Toxicity Category 4, Eye Irritation Category 2A, Skin Irritation Category 2, Specific Target Organ Toxicity (Central Nervous and Neurological Systems) Repeated Exposure Category 2, Skin Sensitization Category 1, Aquatic Acute Toxicity Category 1, Aquatic Chronic Toxicity Category 1

Signal Word: Warning

Hazard Statements:


Precautionary Statements:


Response: P301 + P312: If swallowed, Call a POISON CENTER or doctor if you feel unwell. P330: Rinse mouth. 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. P337 + P313: If eye irritation persists: Get medical advice/attention. P302 + P352: IF ON SKIN: Wash with plenty of soap and water. P333 + P313: If skin irritation or rash occurs: Get medical advice/attention. P362 + P364: Take off contaminated clothing and wash it before reuse. P314: Get medical advice/attention if you feel unwell. P321: Specific treatment (remove from exposure and treat symptoms). Refer to other portions of precautionary text on this label, SDS or other product information sheets, as appropriate. P391: Collect spillage. P370 + P378: In case of fire: Use materials appropriate for surrounding fire for extinction.

Storage: P403 + P235: Store in a well-ventilated place.

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

Hazard Symbols/Pictogram: GHS07, GHS08, GHS09

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information presented in this Material Safety Data Sheet is presented in good faith based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. In no case shall the descriptions, information, data or designs provided be considered a part of our terms and conditions of sale.

All materials may present hazards and should be used with caution. Because many factors may affect processing or application/use, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices or applicable federal, state, or local laws or regulations. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.
DEFINITIONS OF TERMS

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

**KEY ACRONYMS:**

- **CHEMTREC:** Chemical Transportation Emergency Center, a 24-hour emergency information and/or emergency assistance to emergency responders.
- **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 or animals, or which produce mutagenic effects in somatic cells of mammals in vivo and have been shown to reach the germ cells in an active form.
  3B: Substances 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 may be 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 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.
DEFINITIONS OF TERMS (Continued)

- Physical Hazards (continued)

- Personal Protective Equipment (continued)

- Health Hazards (continued)

- Hazardous Materials Identification System (continued)

- Environmental Hazards (continued)

- Fire Protection (continued)

- Explosives (continued)

- Flammable Liquids (continued)

- Flow Chart: Identification of Respectable Hazardous Materials

- Description of Hazardous Materials

- Key Acronyms (continued)

- Materials that are normally stable, even under fire conditions and will not react with water.

- Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials corrosive to the respiratory tract, eyes, and skin.

- Materials that, under emergency conditions, can cause significant injury. 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 20 mg/L. Materials with an LC50 for acute dermal toxicity greater than 200 mg/kg but less than or equal to 2000 mg/kg. Materials with an LC50 for acute oral toxicity greater than 5 mg/kg but less than or equal to 50 mg/kg. Materials that slightly to moderately irritate the respiratory tract, eyes, and skin.

- Materials that cause severe, but reversible irritation to the respiratory tract, eyes, and skin. 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.

- Materials that, under emergency conditions, can cause serious or permanent injury. Gases with an LC50 less than or equal to 10 ppm. Materials with an LC50 for acute dermal toxicity greater than 100 mg/kg but less than or equal to 1000 mg/kg. Materials with an LC50 for acute skin toxicity greater than 20 mg/kg but less than or equal to 100 mg/kg.

- 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 in air at 30°C (86°F) is equal to or greater than its LC50 for acute inhalation toxicity. Any liquid whose saturated vapor concentration in air at 20°C (68°F) is equal to or greater than one-fifth its LC50 for acute inhalation toxicity, if its LC50 is greater than 3,000 ppm but less than or equal to 5,000 ppm. Any liquid whose saturated vapor concentration in air at 20°C (68°F) is equal to or greater than 0.5 mg/L.

- Materials with an LEL greater than 50% lower flammability limit but less than or equal to 0.5%. Any liquid whose saturated vapor concentration in air at 20°C (68°F) is equal to or greater than one-fifth its LC50 for acute inhalation toxicity, if its LC50 is greater than 3,000 ppm but less than or equal to 5,000 ppm. Any liquid whose saturated vapor concentration in air at 20°C (68°F) is equal to or greater than 0.5 mg/L.

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DEFINITIONS OF TERMS (Continued):

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD: 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 9.4°C (20°F) (i.e. Class IIB, IIIA). 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, Annex 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) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures 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 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) (i.e. Class IIB 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. 4 Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature and that are readily dispersed in air and will burn readily. Flammable gases. Flammable cryogenic materials. Any liquid or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e Class I 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: Materials in that 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. Materials that are intrinsically inert, 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. 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 100 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

Toxicity HAZARD: 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) at 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. LEI: 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 Toxicity: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. L LO: Lethal Dose (solids & liquids) that kills 50% of the exposed animals. LC 50: 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/mL: 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. TDx: LDoLo, LDoHi; or TCx: LCoLo, LCoHi. 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 that causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance that interferes in any way with the reproductive process.

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. logKow or logKoc: Coefficient of Oil/Water Distribution is used to assess a substance’s behavior in the environment.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material.

U.S.: EPA: 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. TC: 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: