

SAFETY DATA SHEET



Pecora Universal Color Pouches

1. PRODUCT IDENTIFICATION

IDENTIFICATION of the SUBSTANCE or PREPARATION

<u>TRADE NAME (AS LABELED):</u>	Pecora Universal Color Pouches
<u>PRODUCT DESCRIPTION:</u>	Pigment Pastes
<u>CHEMICAL NAME/CLASS:</u>	Pigment/Silica and Color Carrier
<u>SYNONYMS:</u>	None
<u>RELEVANT USE:</u>	Colorants
<u>USES ADVISED AGAINST:</u>	Other Than Relevant Use

COMPANY/UNDERTAKING IDENTIFICATION:

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

<u>PREPARATION DATE:</u>	September 01, 2013
<u>REVISION DATE:</u>	October 3, 2014

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 Z400.1-2010 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: Skin Irritation Cat. 2, Eye Irritation Cat. 2B, STOT (Inhalation-Respiratory Irritation) SE Cat. 3, STOT (Inhalation-Respiratory System) RE Cat. 2, Skin Sensitization Cat. 1

Signal Word: Warning

Hazard Statement Codes: H315 + H320, H335, H373, H317

Precautionary Statement Codes: P260, P264, P271, P272, P280, P302 + P352, P333 + P313, P362 + P364, P305 + P351 + P338, P304 + P340, P321, P403 + P233 + P405, P501

Hazard Symbols/Pictogram: GHS07, GHS08



EMERGENCY OVERVIEW:

Physical Description: These products are colorants which come in 51 different colors and are supplied in small pouches.

Health Hazards: Skin and eye contact may cause mechanical irritation (abrasion). Inhalation may cause irritation. Prolonged skin contact may cause dermatitis. As a vanadium compound, the Bismuth Vanadium Oxide pigment can be a skin sensitizer and may cause allergic reactions in susceptible individuals. Some of the pigments contain Titanium Dioxide and Carbon Black, which are suspect carcinogens. Some pigments contain iron oxides which can cause siderosis if contact is chronic. The Bismuth Vanadium Oxide pigment may cause adverse effects to the respiratory system by repeated inhalation.

Flammability Hazard: These products are not flammable or combustible; however, finely-divided dusts from the product can present a serious hazard of an air-dust explosion.

Reactivity Hazard: These products are not reactive.

Environmental Hazard: These products may pose a hazard to the environment, especially those that contain bismuth, copper or vanadium compounds.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS®)

Health	2*
Flammability	1
Physical Hazard	0

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: Classes 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

Chemical Name	CAS #	W/W%	LABEL ELEMENTS GHS Classification Hazard Statements
The following materials comprise the independent pigment vehicle			
Proprietary Color Carrier		90.0-97.0%	SELF CLASSIFICATION Classification: Not Applicable
Amorphous Fumed Silica	112945-52-5	3.0-6.0%	SELF CLASSIFICATION Classification: Not Applicable
Proprietary Dispersant		1.0-5.0%	SELF CLASSIFICATION Classification: Not Applicable
The following are pigments that may be in each individual colored product; not all of the following materials are in every product color			
Aluminum Oxide	1344-28-1	0.0-5.0%	SELF CLASSIFICATION Classification: Not Applicable
Amorphous Silica	7631-86-9	0.0-5.0%	SELF CLASSIFICATION Classification: Not Applicable
Carbon Black	1333-86-4	0.0-20.0%	SELF-CLASSIFICATION Classification: Carcinogenic Cat. 2 Hazard Statement Codes: H351
Iron Oxide Red	1309-37-1	0.0-35.0%	SELF CLASSIFICATION Classification: Not Applicable
Titanium Dioxide	13463-67-7	0.0-35.0%	SELF-CLASSIFICATION Classification: Carcinogenic Cat. 2 Hazard Statement Codes: H351
Bismuth Vanadium Oxide	14059-33-7	0.0-5.0%	SELF-CLASSIFICATION Classification: Skin Sensitization Cat. 1B, STOT (Inhalation-Respiratory System) RE Cat. 2 Hazard Statement Codes: H317, H373
Copper Phthalocyanine	147-14-8	0.0-5.0%	SELF CLASSIFICATION Classification: Aquatic Acute Cat. 2 Hazard Statement Codes: H401
Proprietary Polymer		0.0-5.0%	SELF CLASSIFICATION Classification: Not Applicable

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 inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

Skin Exposure: If the product 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. Seek immediate medical attention.

Ingestion: If this product 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 cupfuls 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: Respiratory or skin conditions 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: Not determined.

AUTOIGNITION: Unknown.

FLAMMABLE LIMITS IN AIR: Unknown.

5. FIRE-FIGHTING MEASURES (Continued)

EXTINGUISHING MEDIA:

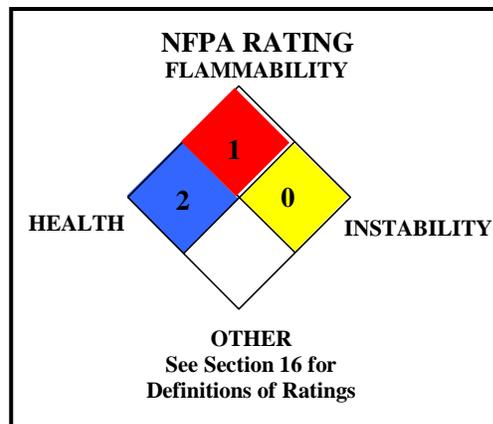
Suitable Extinguishing Media: Use extinguishing material suitable to the surrounding fire, including foam, halon, carbon dioxide and dry chemical.

Unsuitable Extinguishing Media: None known.

PROTECTION OF FIREFIGHTERS:

Special Hazards Arising From the Substance: This material is not flammable or combustible; however, finely-divided dusts can pose a serious air/dust explosion hazard. Not sensitive to mechanical impact under normal conditions. Not sensitive to static discharge under normal conditions.

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: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. 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.

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), 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. Carefully sweep or vacuum spilled material, avoiding generation of dusts. An explosion-proof vacuum should be used. Do not dry-sweep crystalline silica. Whenever possible, wet down with a water spray to minimize the amount of dust or use a vacuum equipped with HEPA filters. 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.

ENVIRONMENTAL PRECAUTIONS: Minimize use of water to prevent environmental contamination. Prevent spill or rinsate 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 dusts. Do not taste or swallow. Use only with adequate ventilation. 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.

PRODUCT END USE: This product is a Part C for an aggregate epoxy. Follow all industry standards for use of this product.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

Ventilation and Engineering Controls: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS/CONTROL PARAMETERS (continued):

Occupational/Workplace Exposure Limits/Guidelines:

Chemical Name	CAS #	Guideline	Value
Aluminum Oxide	1344-28-1	OSHA PEL TWA DFG MAK TWA DFG PREGNANCY RISK CAT	15 mg/m ³ (total dust), 5 mg/m ³ 4 mg/m ³ (inhalable fraction); 1.5 mg/m ³ (respirable fraction) D
Amorphous Silica	7361-85-9	NE	NE
Amorphous Fumed Silica	112945-52-5	OSHA PEL TWA/STEL NIOSH REL TWA	20 mppcf or 80 mg/m ³ / % SiO ₂ 6 mg/m ³ (see NIOSH Pocket Guide Appendix C)
Bismuth Vanadium Oxide Exposure limits are for Vanadium and inorganic compounds	14059-33-7	DFG MAK TWA DFG MAK GERM CELL MUTAGEN CAT.	Inhalable fraction 2
Carbon Black	1333-86-4	ACGIH TLV TWA OSHA PEL TWA NIOSH REL TWA NIOSH IDLH DFG MAK TWA	3 mg/m ³ inhalable fraction 3.5 mg/m ³ 3.5 mg/m ³ (0.1 mg/m ³ in presence of PAHs) (see NIOSH Pocket Guide Appendix C) 1750 mg/m ³ As inhalable dust
Copper Phthalocyanine Exposure limits are for dusts and mists as Cu and fume	147-14-8	ACGIH TLV TWA OSHA PEL TWA NIOSH REL TWA NIOSH IDLH	Dusts & Mists: 1 mg/m ³ ; Fume: 0.2 mg/m ³ Dusts & Mists: 1 mg/m ³ ; Fume: 0.1 mg/m ³ Dusts & Mists: 1 mg/m ³ ; Fume: 0.1 mg/m ³ 100 mg/m ³ , as Cu
Proprietary Color Carrier		NE	NE
Iron Oxide, Red	1309-37-1	ACGIH TLV TWA OSHA PEL TWA NIOSH REL TWA NIOSH IDLH DFG MAK TWA	5 mg/m ³ respirable fraction 10 mg/m ³ fume 5 mg/m ³ dust and fume, as Fe 2500 mg/m ³ , as Fe With the exception of iron oxides which are not biologically available
Proprietary Dispersant		NE	NE
Proprietary Polymer		NE	NE
Titanium Dioxide	13463-67-7	ACGIH TLV TWA OSHA PEL TWA NIOSH REL	10 mg/m ³ NIC: 1 mg/m ³ 15 mg/m ³ total dust Lowest feasible concentration (LOQ 0.2 mg/m ³) 15 mg/m ³ (ceiling) 15 min.

NE = Not Established. mppcf: Millions of Particles per Cubic Foot See Section 16 for Definitions of Terms Used.

PERSONAL PROTECTIVE EQUIPMENT (PPE): *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, including the Respiratory Protection Standard (29 CFR 1910.134), Eye Protection Standard 29 CFR 1910.13, the Hand Protection Standard 29 CFR 1910.138, and the Foot Protection Standard 29 CFR 1910.136), equivalent standards of Canada (including the Canadian CSA Respiratory Standard Z94.4-93-02, the CSA Eye Protection Standard Z94.3-M1982, Industrial Eye and Face Protectors and the Canadian CSA Foot Protection Standard Z195-M1984, Protective Footwear). Please reference applicable regulations and standards for relevant details*

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 dust from this product is 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. The following are NIOSH respiratory equipment guidelines for some of the pigments.

CARBON BLACK **CONCENTRATION**

RESPIRATORY PROTECTION

Up to 17.5 mg/m³:

Any Dust and Mist Respirator.

Up to 35 mg/m³:

Any Dust and Mist Respirator except single-use and quarter-mask respirators, or any Supplied-Air Respirator (SAR).

Up to 87.5 mg/m³:

Any SAR operated in a continuous-flow mode, or any Powered, Air-Purifying Respirator (PAPR) with a dust and mist filter.

Up to 175 mg/m³:

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

Up to 1750 mg/m³:

Any SAR operated in a pressure-demand or other positive-pressure mode.

Emergency or Planned 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 self-contained breathing apparatus 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.

In Presence of Polycyclicaromatic Hydrocarbons:

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

PERSONAL PROTECTIVE EQUIPMENT (continued):

Respiratory Protection (continued):

CARBON BLACK (continued)

<u>CONCENTRATION</u>	<u>RESPIRATORY PROTECTION</u>
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Based on NIOSH REL at Concentrations Above the NIOSH REL, or Where There is No REL, at Any Detectable Concentration: 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.

IRON OXIDE

<u>CONCENTRATION</u>	<u>RESPIRATORY PROTECTION</u>
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Up to 50 mg/m³: Any dust, mist, and fume respirator, or any Supplied-Air Respirator (SAR).

Up to 125 mg/m³: Any SAR operated in a continuous-flow mode, or any Powered, Air-Purifying Respirator (PAPR) with a dust, mist, and fume filter.

Up to 250 mg/m³: Any Air-Purifying, Full-Facepiece Respirator with a high-efficiency particulate filter, or any SAR that has a tight-fitting facepiece and is operated in a continuous-flow mode, or any PAPR with a tight-fitting facepiece and a high-efficiency particulate filter, or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece, or any SAR with a full facepiece.

Up to 2500 mg/m³: Any SAR operated in a pressure-demand or other positive-pressure mode.

Emergency or Planned 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 self-contained breathing apparatus 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.

TITANIUM DIOXIDE

<u>CONCENTRATION</u>	<u>RESPIRATORY PROTECTION</u>
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At Concentrations Above the NIOSH REL, or Where There is No REL, at Any Detectable Concentration: Any Self-Contained Breathing Apparatus (SCBA) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any Supplied-Air Respirator (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.

9. PHYSICAL and CHEMICAL PROPERTIES

FORM: Colorant paste.

MOLECULAR WEIGHT: Varies.

ODOR: None.

SPECIFIC GRAVITY: Varies.

SOLUBILITY IN WATER: Insoluble.

MELTING POINT: Not applicable.

VOC (less water and exempt): 50 g/L

FLASH POINT: Not flammable or combustible.

CRITICAL TEMPERATURE: Not applicable.

pH: Not available.

OTHER SOLUBILITIES: None.

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

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.

COLORS: 51 different colors.

MOLECULAR FORMULA: Varies

ODOR THRESHOLD: Not applicable.

VAPOR PRESSURE, mm Hg @ 20°C: Practically zero.

EVAPORATION RATE (BuAc = 1): Not applicable.

BOILING POINT: Not applicable.

WEIGHT % VOC: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

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

VISCOSITY: Not applicable.

10. STABILITY and REACTIVITY

CHEMICAL STABILITY: Stable at normal temperature.

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

INCOMPATIBLE MATERIALS: This material is not compatible with strong oxidizers and strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS: *Combustion*: None. *Hydrolysis*: None.

POSSIBILITY OF HAZARDOUS REACTIONS/POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this material are as follows:

Contact with Skin or Eyes: Skin contact may cause abrasion. Prolonged skin contact may cause irritation. Skin contact can cause staining due to the pigments. Eye contact will cause mechanical irritation, with redness, pain and tearing.

Skin Absorption: This product does not skin absorb.

Ingestion: Ingestion may result in gastric upset, abdominal pain. Ingestion of large amount may be harmful.

Inhalation: Inhalation of this product will cause mechanical irritation to the respiratory system, cough or sore throat. Chronic inhalation causes damage to the lungs. Refer to 'Other Potential Health Effects' for more information.

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

OTHER POTENTIAL HEALTH EFFECTS: Prolonged or repeated exposure to fine airborne silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed (see Sampling and Analysis section) and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure. Particles with diameters less than 1 micrometre and freshly cleaved particles (for example, those produced by sandblasting) are considered most hazardous.

11. TOXICOLOGICAL INFORMATION (Continued)

OTHER POTENTIAL HEALTH EFFECTS (continued): Several reliable studies have found silicosis in employees with exposure to considerably less than 1 mg/m³ respirable quartz. Early symptoms of silicosis (cough, mucous production and shortness of breath upon exertion) are non-specific, so the development of silicosis may not be detected until advanced stages of the disease. Silicosis may continue to develop even after exposure to crystalline silica has stopped. Evidence of silicosis can normally be seen on an X-ray. Silicosis can vary in severity from minimal to severe. In cases of mild silicosis, there is typically no significant respiratory impairment, although there is X-ray evidence of lung injury. In severe cases, significant and increasingly severe respiratory impairment develops. There is no proven effective treatment for the disease. Life expectancy may be reduced, depending on the severity of the case. Death is not usually a direct result of silicosis, but cardiac failure (cor pulmonale) may occur as the heart has increasing difficulty pumping blood through the scar tissue in the lungs. Silicosis may be complicated by the development of bacterial infections, including tuberculosis. Accelerated silicosis results from exposure to high concentrations of crystalline silica over a period of 5 to 10 years. The disease continues to develop even after exposure stops and is often associated with autoimmune diseases, for example, scleroderma (a skin disease involving thickening of the skin). "Acute" silicosis (also referred to as "silicotic alveolar proteinosis") is rare in humans, but can develop if very high concentrations of crystalline silica dust are inhaled over a relatively short period of time (1-2 years) and has occurred in occupations such as sandblasting or tunnelling where exposure controls were minimal. Acute silicosis may result in death within a few years, often with tuberculosis as a complication.

Silica dust can accumulate in the lungs. Inhaled particles are deposited at various locations within the respiratory tract, depending on their shape, mass, aerodynamic characteristics and other physical properties. Most, but not all, silica is cleared from the lungs after inhalation and deposition. The elimination of particles continues for many years after the last exposure. Silica is slightly absorbed into the body. Absorbed silica is deposited mainly in the liver, spleen and regional lymph nodes. Silicic acid absorbed into the blood stream is excreted through the kidneys.

Bismuth compounds are often poorly absorbed. Should absorption occur, exposure may cause loss of appetite, headache, skin rash, dermatitis, kidney, bladder or liver injury, and jaundice. Repeated or prolonged exposure may cause a black line or spots on gums, foul breath and excess saliva.

Repeated exposure to Vanadium compounds by inhalation can cause bronchitis, bronchospasms, severe cough and asthma-like disease. Repeated exposure to vanadium compounds can cause adverse effects on the blood including anemia, and red blood cell damage, and abnormal increase in red blood cell volume, gastrointestinal disorders, nervous system disorders and abnormal blood or protein in the urine.

Chronic exposure to Iron Oxides can cause siderosis, which is a deposition of iron particles into tissues, causing yellow staining.

TARGET ORGANS: Acute: Eyes, respiratory system. Chronic: Lungs, liver, blood, central nervous and gastrointestinal systems.

CHRONIC EFFECTS: The Carbon Black and Titanium Dioxide components are suspect carcinogens. Chronic exposure may also cause other adverse effects described under 'Other Health Effects'.

TOXICITY DATA: Currently, the following toxicity data are available for the components of this product in 1% concentration or more.

ALUMINUM OXIDE:

LD₅₀ (Intraperitoneal-Mouse) > 3600 mg/kg

TCLo (Inhalation-Rat) 200 mg/m³/5 hours/28 weeks-intermittent: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi, chronic pulmonary edema; Related to Chronic Data: death

TCLo (Inhalation-Rabbit) 200 mg/m³/5 hours/28 weeks-intermittent: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi; Lungs, Thorax, or Respiration: chronic pulmonary edema; Related to Chronic Data: death

TDLo (Intraperitoneal-Rabbit) 90 mg/kg: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria; Lungs, Thorax, or Respiration: tumors

TDLo (Implant-Rat) 200 mg/kg: Tumorigenic: neoplastic by RTECS criteria; Tumorigenic: tumors at site of application

TD (Implant-Rat) 200 mg/kg: Tumorigenic: equivocal tumorigenic agent by RTECS criteria, tumors at site of application

AMORPHOUS SILICA:

Standard Draize Test (Eye-Rabbit) 25 mg/24 hours: mild

LC (Inhalation-Rat) > 200 gm/m³/1 hour: Lungs, Thorax, or Respiration: fibrosis, focal (pneumoconiosis)

LCLo (Inhalation-Rat) 2190 mg/m³/4 hours: Lungs, Thorax, or Respiration: dyspnea

TCLo (Inhalation-Rat) 30 mg/m³/6 hours/6 weeks-intermittent: Sense Organs and Special Senses (Eye): lachrymation; Lungs, Thorax, or Respiration: pulmonary emboli; Gastrointestinal: changes in structure or function of salivary glands

TCLo (Inhalation-Rat) 24.4 mg/m³/5 days-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

LDLo (Oral-Rat) 5 gm/kg: Nutritional and Gross Metabolic: other changes

TDLo (Oral-Dog) 224 mg/kg/4 weeks-continuous: Gastrointestinal: hypermotility, diarrhea; Kidney/Ureter/Bladder: urine volume increased

TDLo (Intratracheal-Rat) 1 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

AMORPHOUS FUMED SILICA:

LD₅₀ (Oral-Rat) 3160 mg/kg

LD₅₀ (Intravenous-Rat) 15 mg/kg: Lungs, Thorax, or Respiration: acute pulmonary edema

TCLo (Inhalation-Rat) 154 mg/m³/6 hours/4 weeks-intermittent: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases, Metabolism (Intermediary): other proteins

TCLo (Inhalation-Rat) 5.41 mg/m³/5 days-intermittent: Lungs, Thorax, or Respiration: other changes, changes in lung weight; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 1.39 mg/m³/5 days-intermittent: Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (Intratracheal-Mouse) 96.77 mg/kg: Lungs, Thorax, or Respiration: acute pulmonary edema, other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

AMORPHOUS FUMED SILICA (continued):

TDLo (Intratracheal-Mouse) 50 mg/kg: Lungs, Thorax, or Respiration: changes in lung weight

TDLo (Intratracheal-Mouse) 2 mg/kg: 2 mg/kg: Lungs, Thorax, or Respiration: fibrosis, focal (pneumoconiosis), other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intratracheal-Mouse) 2 mg/kg: Lungs, Thorax, or Respiration: fibrosing alveolitis; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: peptidases, Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intratracheal-Mouse) 2 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: peptidases

LDLo (Intratracheal-Rat) 50 mg/kg

LDLo (Intratracheal-Rat) 10 mg/kg

LDLo (Intratracheal-Mouse) 96.77 mg/kg: Lungs, Thorax, or Respiration: acute pulmonary edema, dyspnea, other changes

CARBON BLACK:

LD₅₀ (Oral-Rat) > 15 400 mg/kg: Behavioral: somnolence (general depressed activity)

LD₅₀ (Skin-Rabbit) > 3 gm/kg

TCLo (Inhalation-Rat) 7 mg/m³: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 1.66 mg/m³/7 hours: Lungs, Thorax, or Respiration: sputum; Blood: changes in leukocyte (WBC) count; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 50 mg/m³: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 229 mg/m³/6 hours: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 50 mg/m³/6 hours/90 days-intermittent: Lungs, Thorax, or Respiration: other changes

TCLo (Inhalation-Rat) 1 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration - other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 1 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes, changes in lung weight; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 50 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): other, Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 50 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): other

TCLo (Inhalation-Rat) 7 mg/m³/6 hours/13 weeks-intermittent: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA:

CARBON BLACK (continued):

TCLo (Inhalation-Rat) 11,600 µg/m³/18 hours/2 years-intermittent: Tumorigenic: carcinogenic by RTECS criteria; Lungs, Thorax, or Respiration: tumors

TCLo (Inhalation-Mouse) 50 mg/m³/6 weeks: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified

TCLo (Inhalation-Mouse) 1 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Mouse) 1 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes, changes in lung weight; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Mouse) 7 mg/m³/6 hours/13 weeks-intermittent: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Hamster) 7 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Hamster) 50 mg/m³/6 hours/13 weeks-intermittent: Sense Organs and Special Senses (Olfaction): effect, not otherwise specified

TDLo (Oral-Mouse) 20,000 µg/kg/4 weeks-intermittent: Brain and Coverings: other degenerative changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Skin-Rat) 11 gm/kg/4 weeks-intermittent: Blood: pigmented or nucleated red blood cells; Liver: changes in liver weight; Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (Intravenous-Rat) 10 mg/kg/2 minutes: Liver: changes in liver weight; Blood: changes in spleen

TDLo (Intravenous-Rat) 10 mg/kg/2 minutes: Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: hepatic microsomal mixed oxidase (dealkylation, hydroxylation, etc.)

TDLo (Intratracheal-Rat) 16 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intratracheal-Rat) 15 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: cytochrome oxidases (including oxidative phosphorylation)

TDLo (Intratracheal-Rat) 10 mg/kg: Lungs, Thorax, or Respiration: sputum; Biochemical: Metabolism (Intermediary): other proteins; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intratracheal-Mouse) 1000 µg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intratracheal-Mouse) 20 mg/kg/4 days-intermittent: Lungs, Thorax, or Respiration: sputum; Immunological Including Allergic: increase in cellular immune response; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intratracheal-Mouse) 4000 µg/kg/4 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Immunological Including Allergic: increase in cellular immune response; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Parenteral-Mouse) 36 µg/kg/3 days-intermittent: Immunological Including Allergic: increase in humoral immune response

Mutation in Microorganisms (Bacteria-*Salmonella typhimurium*) 1 mg/plate

DNA Adduct (Inhalation-Mouse) 6200 µg/m³/16 hours/12 weeks-intermittent

DNA Damage (Human Lymphocyte) 16 µg/L/48 hours

DNA Damage (Inhalation-Rat) 50 µg/L/13 weeks-intermittent

DNA Damage (Inhalation-Rat) 50 gm/L/13 weeks

COPPER PHTHALOCYANINE:

LD (Oral-Rat) > 15 gm/kg

LD (Intraperitoneal-Rat) > 3 gm/kg: Kidney/Ureter/Bladder: urine volume decreased, proteinuria

PROPRIETARY COLOR CARRIER:

LD₅₀ (Oral-Rat) > 5000 mg/kg

LD₅₀ (Skin-Rat) > 2000 mg/kg

IRON OXIDE, RED:

LDLo (Subcutaneous-Dog) 30 mg/kg

TCLo (Inhalation-Rat) 50 mg/m³/12 hours: Behavioral: excitement, fluid intake; Gastrointestinal: hypermotility, diarrhea

TCLo (Inhalation-Rat) 50 mg/m³/60 hours: Behavioral: excitement, fluid intake; Gastrointestinal: hypermotility, diarrhea

TCLo (Inhalation-Rat) 0.8 mg/kg: Lungs, Thorax, or Respiration: emphysema; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: multiple enzyme effects, Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 500 µg/m³/24 hours/61 days-continuous: Brain and Coverings: other degenerative changes; 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-Rat) 0.5 mg/m³/24 hours/60 days-continuous: Brain and Coverings: changes in circulation (hemorrhage, thrombosis, etc.); Liver: other changes; Vascular: measurement of regional blood flow

TDLo (Intratracheal-Rat) 250 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: multiple enzyme effects

IRON OXIDE, RED (continued):

TDLo (Intratracheal-Rat) 12 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other Enzymes

TDLo (Subcutaneous-Rat) 135 mg/kg: Tumorigenic: equivocal tumorigenic agent by RTECS criteria, tumors at site of application

DNA Damage (Human Lung) 40 µg/disk/4 hours

TITANIUM DIOXIDE:

Standard Draize Test (Skin-Human) 300 µg/3 days-intermittent: Mild

TC (Inhalation-Rat) 10 mg/m³/18 hours/2 years-intermittent: Tumorigenic: carcinogenic by RTECS criteria; Lungs, Thorax, or Respiration: tumors

LD (Intratracheal-Rat) > 100 µg/kg: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi; Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other Enzymes

TD (Intramuscular-Rat) 260 mg/kg/84 weeks-intermittent: Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Blood: lymphoma, including Hodgkin's disease; Tumorigenic: tumors at site of application

TDLo (Oral-Rat) 60 gm/kg: Gastrointestinal: hypermotility, diarrhea, other changes

TDLo (Intramuscular-Rat) 360 mg/kg/2 years-intermittent: Tumorigenic: neoplastic by RTECS criteria; Blood: lymphoma, including Hodgkin's disease; Tumorigenic: tumors at site of application

TDLo (Intratracheal-Rat) 1.25 mg/kg: Vascular: regional or general arteriolar constriction; Lungs, Thorax, or Respiration: other changes

TDLo (Intratracheal-Rat) 1.6 mg/kg: Lungs, Thorax, or Respiration: other changes

TDLo (Intratracheal-Rat) 5 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TDLo (Intratracheal-Mouse) 100 mg/kg: Tumorigenic: increased incidence of tumors in susceptible strains

TCLo (Inhalation-Rat) 1 mg/kg: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 250 mg/m³/6 hours/4 weeks-intermittent: Lungs, Thorax, or Respiration: chronic pulmonary edema, other changes

TCLo (Inhalation-Rat) 50 mg/m³/6 hours/13 weeks-intermittent: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi

TCLo (Inhalation-Rat) 10 mg/m³/6 hours/13 weeks-intermittent: Lungs, Thorax, or Respiration: fibrosis (interstitial), other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 10 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 50 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: sputum; Blood: changes in cell count (unspecified); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases

TCLo (Inhalation-Rat) 250 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Blood: changes in cell count (unspecified); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases

TCLo (Inhalation-Rat) 274 mg/m³/5 days-intermittent: Lungs, Thorax, or Respiration: changes in lung weight; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: multiple enzyme effects, Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Rat) 250 mg/m³/6 hours/2 years-intermittent: Tumorigenic: carcinogenic by RTECS criteria; Lungs, Thorax, or Respiration: tumors

TCLo (Inhalation-Mouse) 10 mg/m³/6 hours/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Mouse) 10 mg/m³/6 hours/13 weeks-intermittent: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi

TCLo (Inhalation-Mouse) 10 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: other changes; Biochemical: Metabolism (Intermediary): effect on inflammation or mediation of inflammation

TCLo (Inhalation-Mouse) 50 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: sputum; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases

TCLo (Inhalation-Mouse) 250 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: sputum; Blood: changes in cell count (unspecified); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases

TCLo (Inhalation-Hamster) 250 mg/m³/6 hours/13 weeks-intermittent: Lungs, Thorax, or Respiration: structural or functional change in trachea or bronchi

TCLo (Inhalation-Hamster) 250 mg/m³/13 weeks-intermittent: Lungs, Thorax, or Respiration: sputum; Blood: changes in cell count (unspecified); Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: dehydrogenases

DNA Damage (Human Lung) 100 µg/plate

DNA Damage (Human Lung) 20 µg/disk/4 hours

Sister Chromatid Exchange (Human Lymphocyte) 2 µmol/L/72 hours

Micronucleus Test (Human Lymphocyte) 5 µmol/L/72 hours

Micronucleus Test (Intraperitoneal-Mouse) 3 gm/kg/3 days-continuous

Micronucleus Test (Hamster Ovary) 5 µmol/L

DNA Inhibition (Hamster Lung) 500 mg/L

Sister Chromatid Exchange (Hamster Ovary) 1 µmol/L

CARCINOGENIC POTENTIAL: The following table summarizes the carcinogenicity listing for the components of this product. "NO" indicates that the substance is not considered to be or suspected to be a carcinogen by the listed agency, see section 16 for definitions of other ratings.

CHEMICAL	EPA	IARC	NTP	NIOSH	ACGIH	OSHA	PROP 65
Aluminum Oxide	No	No	No	NO	No	No	No
Amorphous Silica	No	No	No	No	No	No	No

11. TOXICOLOGICAL INFORMATION (Continued)

CARCINOGENIC POTENTIAL (continued):

CHEMICAL	EPA	IARC	NTP	NIOSH	ACGIH	OSHA	PROP 65
Amorphous Fumed Silica	No	3	No	No	No	No	No
Bismuth Vanadium Oxide	No	No	No	No	A4	No	No
Carbon Black	No	2B	No	Ca (in presence of PAHs)	A3	No	Yes (airborne unbound particles of respirable size)
Copper Phthalocyanine	D	No	No	No	No	No	No
Proprietary Color Carrier	No	No	No	No	No	No	No
Iron Oxide, Red	No	3	No	No	No	No	No
Proprietary Dispersant	No	No	No	No	No	No	No
Proprietary Polymer	No	No	No	No	No	No	No
Titanium Dioxide	No	2B	No	Ca	A3	No	No

ACGIH TLV-A3: Confirmed Animal Carcinogen. ACGIH TLV-A4: Not Classifiable as a Human Carcinogen. ACGIH TLV-A3: Confirmed Animal Carcinogen with Unknown Relevance to Humans. EPA-D: Not Classifiable as to Human Carcinogenicity. IARC 2B: Possibly Carcinogenic to Humans. IARC-3: Unclassifiable as to Carcinogenicity in Humans. NIOSH-Ca (Potential Occupational Carcinogen with No Further Categorization)

IRRITANCY OF PRODUCT: This product may irritate contaminated tissue, especially if contact is prolonged. Eye irritation may be severe or cause burns.

SENSITIZATION TO THE PRODUCT: Some of the pigments in these products may cause skin sensitization.

TOXICOLOGICAL SYNERGISTIC PRODUCTS: There is disagreement about whether tobacco smoke increases the severity of the effect of silica dust on respiratory impairment. A synergistic effect between smoking and silica and/or silicosis on risk of lung cancer, is also likely.

REPRODUCTIVE TOXICITY INFORMATION: No specific information available.

BIOLOGICAL EXPOSURES INDICES (BEIs): There are no BEI's established for this material.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This is not expected to have significant mobility in soil.

PERSISTENCE AND BIODEGRADABILITY: This material persists and does not biodegrade.

BIO-ACCUMULATION POTENTIAL: This material has no bio-accumulation potential.

ECOTOXICITY: No data available.

OTHER ADVERSE EFFECTS: This material has no 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: Not applicable.

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: No component of this product is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA Hazard Categories (Section 311/312, 40 CFR 370-21): ACUTE: No; 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): Not applicable.

U.S. Clean Air Act (CA 112r) Threshold Quantity (TQ): Not applicable.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL U.S. REGULATIONS (continued):

Other U.S. Federal Regulations: Not applicable.

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): The Carbon Black component (airborne, unbound particles of respirable size) is found on the Proposition 65 List of chemicals known to the state to cause cancer. Due to the form of the product, the Proposition 65 warning is not applicable to this compound in this product.

ADDITIONAL CANADIAN REGULATIONS:

Canadian DSL/NDL Inventory Status: This material is listed on the DSL Inventory.

Canadian Environmental Protection Act (CEPA) Priorities Substances Lists: No component is on the CEPA Priorities Substances Lists.

Canadian WHMIS Regulations: Material is classified as a Controlled Product, Hazard Class D2B (Irritation/Sensitization) as per the Controlled Product 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! CHRONIC INHALATION MAY CAUSE DAMAGE TO RESPIRATORY SYSTEM. INHALATION AND SKIN CONTACT MAY BE IRRITATING, ESPECIALLY IF EXPOSURE IS PROLONGED. CAUSES MECHANICAL IRRITATION TO THE EYES. MAY CONTAIN COMPOUNDS THAT CAN CAUSE SKIN SENSITIZATION AND ALLERGIC REACTION IN SUSCEPTIBLE INDIVIDUALS. MAY CONTAIN COMPOUNDS THAT ARE SUSPECT CARCINOGENS. Cancer hazard depends on duration of inhalation exposure. Avoid contact with eyes, skin, and clothing. Avoid breathing dusts. 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: Do not dry sweep. Wet material and shovel of vacuum. 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: Skin Irritation Category 2, Eye Irritation Category 2B, Specific Target Organ Toxicity (Inhalation-Respiratory Irritation) Single Exposure Category 3, Specific Target Organ Toxicity (Inhalation-Respiratory System) Repeated Exposure Category 2, Skin Sensitization Category 1

Signal Word: Warning

Hazard Statements: H315 + H320: Causes skin and eye irritation. H335: May cause respiratory irritation. H373: May cause damage to respiratory system, liver or blood system through prolonged or repeated exposure. H317: May cause an allergic skin reaction.

Precautionary Statements:

Prevention: P260: Do NOT breathing dust. P264: Wash thoroughly after handling. P271: Use only outdoors or in a well-ventilated area. P272: Contaminated work clothing should not be allowed out of the workplace. P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response: P302 + P352: IF ON SKIN: Wash with plenty of soap and water. P333 + P313: If skin irritation or rash occurs, get medical attention. P362 + P364: Take off contaminated clothing and wash it before reuse. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313: If eye irritation persists: Get medical advice/attention. P304 + P340: If inhaled, remove victim to fresh air and keep at rest in a position comfortable for breathing. 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.

Storage: P403 + P233 + P405: Store in a well-ventilated place. Keep container tightly closed. Store locked up.

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

Hazard Symbols/Pictogram: GHS07, GHS08

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.

REFERENCES AND DATA SOURCES: Contact the supplier for information.

METHODS OF EVALUATING INFORMATION FOR THE PURPOSE OF CLASSIFICATION: Bridging principles were used to classify this product.

REVISION DETAILS: September 2014: Up-date of GHS classification.

DATE OF PRINTING

October 3, 2014

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 of 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 to be not 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 exposures; 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.

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) (i.e. OSHA Class IIIB); 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 course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp); and Solids and semisolids (e.g. viscous and slow flowing as asphalt) that readily give off flammable vapors.

include the following:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 3 Serious Hazard: Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions. 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) (i.e. 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) (i.e. 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:* Packaging 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:* Packaging 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.

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.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS

(continued):

HEALTH HAZARD (continued): 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 according 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 according with Annex D of NFPA 704. Liquids, solids, and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the UN *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 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) (i.e. Class IB and IC liquids). Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with 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 or that are readily dispersed in air and will burn readily. Flammable gases. Flammable cryogenic materials. Any liquid or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5% by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS

(continued):

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions. Materials that have an 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 100 W/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. **TDL₀:** Lowest dose to cause a symptom. **TCLO:** Lowest concentration to cause a symptom. **TD₀, LD₀, LD₅₀, and LDO,** or **TC, TCo, LCLo,** and **LC₀:** 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. **TL_m:** 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: 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:

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