analytikjena
An Endress+Hauser Company

SAFETY DATA SHEET

Prepared to U.S. OSHA 29 CR 1910.1200 (2012), Canadian WHMIS 2015 (HPR-GHS), European Union CLP EC 1272/2008 & the 8th ATP 2016/918, and the Global Harmonization Standard

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

Product Identifier/Trade Name as Labeled: **UVP REVEAL A-680+ LEAK ADDITIVE**

SYNONYMS: None/Mixture
CHEMICAL FAMILY NAME: Mineral Oil-Based Dye
RELEVANT PRODUCT USE: Fluorescent Additive for Oils, Fuels or ATF
USES ADVISED AGAINST: Other than relevant product use.

COMPANY/UNDERTAKING IDENTIFICATION

U.S. Manufacturer/Distributor: **ANALYTIK JENA US LLC**
Address: 2066 W. 11th Street, Upland, CA 91786 USA
Business Phone: Toll Free Phone in US/Canada: (800) 452-6788 (8 am to 5 pm PST) or (909) 946-3197
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General E-Mail: info@us.analytik-jena.com
EMERGENCY PHONE: Infotrac: U.S./Canada/Puerto Rico/U.S. Virgin Islands: 1-800-535-4280 (24 hrs) (International) +1-352-323-3500 (collect-24 hrs)

Date of Preparation: April 2011
Date of Revision: December 6, 2020

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION: This product has been classified per GHS Standards under U.S, Canadian and European regulations.

Classification: Aspiration Toxicity Category 1, Specific Target Organ Toxicity (Dermal-Adrenal Glands, Bones) Repeated Exposure Category 2

Signal Word: Danger

Hazard Statements: H304: May be fatal if swallowed and enters airways. H372: Causes damages to adrenal glands and bones through prolonged or repeated exposure by dermal route.

Precautionary Statements:

Prevention: P260: Do not breathe gas, mist, vapors, spray. P264: Wash thoroughly all contaminated portions of the body after handling. P270: Do not eat, drink or smoke when using this product. P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response: P301 + P316: IF SWALLOWED: Get emergency medical help immediately. P331: Do NOT induce vomiting. P321: Specific treatment (remove from exposure and treat symptoms).

Storage: P405: Store locked up.

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

Hazard Symbol/Pictograms: GHS08

See Section 16 for Classification of components

PERCENTAGE OF UNKNOWN TOXICTIY and PRODUCT ACUTE TOXICITY ESTIMATES (ATE): Due to the lack of data for the main component, it is not possible calculate ATEs by any route. The percentage of unknown toxicity by all routes is 85-90%.

EMERGENCY OVERVIEW: Product Description: This product is a dark red/burgundy, oily liquid with a petroleum oil odor. **Health Hazards:** May cause respiratory system, eye, and skin irritation. Ingestion may be harmful. Aspiration of the product after ingestion may cause potentially fatal pulmonary edema and oil-induced chemical pneumonia. Skin and eye contact may temporarily stain contaminated tissues. **Flammability Hazards:** This product is combustible and may be ignited if exposed to temperatures above 93°C (199.4°F). When involved in a fire, this product may decompose and produce irritating fumes and toxic gases (e.g., carbon, sulfur, nitrogen and phosphorus oxides, reactive hydrocarbons and polycyclic aromatic hydrocarbons [PAHs]). **Reactivity Hazards:** This product is not reactive. **Environmental Hazards:** This product may cause harm to the environment if a large quantity is accidentally released to an aquatic environment. **Emergency Response Procedures:** Emergency responders must wear the proper personal protective equipment (and have appropriate fire-suppression equipment) suitable for the situation to which they are responding.

3. COMPOSITION and INFORMATION ON INGREDIENTS

Chemical Name	CAS #	EINECS or ELNICS #	WT%	LABEL ELEMENTS GHS Classification per U.S., Canadian & EU Standards Hazard Statements
Severely Hydrotreated Naphthenic Oil Contains less than 3% DMSO	64742-53-6	265-156-6	85.0-95.0%	*Harmonized Classification - Annex VI Of Regulation (EC No 1272/2008 (CLP Regulation) Classification: Carcinogen Cat. 1B Hazard Statement Codes: H350 Notified EU ECHA Classification: Classification: Aspiration Hazard Cat. 1, Specific Target Organ Toxicity (Adrenal Glands, Bones) Repeated Exposure Cat. 1 Hazard Statement Codes: H304, H372
Proprietary Yellow Colorant			10.0-20.0%	GHS Classification per ECHA & Canadian WHMIS HPR-2015 & EU CLP 1272/2008: Classification: Not Applicable U.S. OSHA Classification Only (U.S. OSHA HazCom 2012): Combustible Dust Hazard

See Section 16 for full classification information of components. *Carcinogenic classification of this compound not required due to < 3% DMSO.
The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST-AID MEASURES

PROTECTION OF FIRST AID RESPONDERS: Because spill or emergency scenes may be contaminated with other materials, rescuers should not attempt to retrieve or assist persons contaminated with this product who exhibit adverse symptoms without the use adequate personal protective equipment. Evaluation of the situation should include whether personal protective equipment should be used or if it is needed to assist contaminated individuals. Rescuers should be taken for medical attention, if necessary. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

DESCRIPTION OF FIRST AID MEASURES: If adverse effect occurs after exposure, the following information is for first-aid measures to be taken for each route of exposure.

Inhalation Exposure: If mists, sprays or fumes of this material are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect occurs after removal to fresh air.
GHS Precautionary Statements for Inhalation Exposure: None applicable.

Skin Exposure: If the material contaminates the skin and adverse effect occurs, 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 if adverse effects occur after flushing.
GHS Precautionary Statements for Skin Exposure: P264: Wash thoroughly all contaminated portions of the body after handling.

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 medical attention if adverse effect occurs after flushing.
GHS Precautionary Statements for Eye Exposure: Not applicable.

Ingestion Exposure: 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 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. Seek medical attention.
GHS Precautionary Statements for Ingestion Exposure: P301 + P316: IF SWALLOWED: Get emergency medical help immediately. P331: Do NOT induce vomiting.

IMPORTANT SYMPTOMS AND EFFECTS, WHETHER ACUTE OR DELAYED: See Sections 2 (Hazard Identification) and 11 (Toxicological Information) for more detailed information.

Acute:
Symptoms/Effects After Inhalation: Inhalation of vapors, sprays or fumes may cause irritation of the respiratory system.
Symptoms/Effects After Skin Contact: Dermatitis, dry skin.
Symptoms/Effects After Eye Contact: Irritation of eye tissue.
Symptoms/Effects After Ingestion: Unknown; possible irritation of the digestive system and adverse system effects.

Delayed/Chronic:
Symptoms/Effects After Skin Contact: Dermatitis (dry, red skin, itching, cracking of the skin, skin rash/inflammation). Systemic effect as described in Section 11 (Toxicological Information) may occur.
Symptoms/Effects After Accidental Injection: None known.
Symptoms/Effects After Inhalation: None known.
Symptoms/Effects After Ingestion: Unknown; possible adverse system effects.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Skin conditions may be aggravated by exposure to this product.

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

5. FIRE-FIGHTING MEASURES

FLASH POINT (TCC): > 93°C (> 199.4°F)
AUTOIGNITION TEMPERATURE: Not available.
FLAMMABLE LIMITS (in air by volume, %): Not available.
FIRE EXTINGUISHING MEDIA: Water fog or fine spray, appropriate foam for naphthenic oils, carbon dioxide and dry chemical. Water or foam may cause frothing and must be used correctly.
GHS Precautionary Statements Fire Extinguishing Media: None applicable.

5. FIRE-FIGHTING MEASURES (Continued)

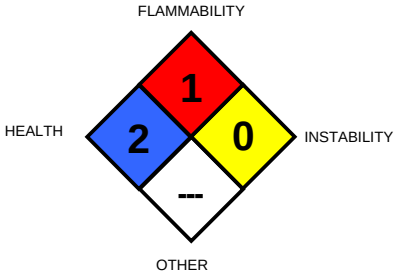
UNSUITABLE FIRE EXTINGUISHING MEDIA: Streams or jets of water may spread fire.

SPECIFIC HAZARDS ARISING FROM THE PRODUCT: This product is combustible and can ignite when exposed to temperature of its flash point. When involved in a fire, this material may ignite and produce toxic gases (including carbon, sulfur, nitrogen and phosphorus oxides, reactive hydrocarbons and polycyclic aromatic hydrocarbons [PAHs]). Liquid can float on water and may travel to distant locations and/or spread fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: May be sensitive, may accumulate static charge by agitation or pouring.

NFPA RATING



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

SPECIAL PROTECTIVE ACTIONS FOR FIRE-FIGHTERS: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Water spray can be used to cool fire-exposed containers. If this material is involved in a fire, fire runoff water should be contained to prevent possible environmental damage. If necessary, decontaminate fire-response equipment with soap and water solution.

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. Eliminate all sources of ignition. Use non-sparking tools. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Avoid allowing water runoff to contact spilled material. The atmosphere must at least 19.5 percent Oxygen before non-emergency personnel can be allowed in the area without Self-Contained Breathing Apparatus. Spills on certain surfaces may be slippery and present a slip hazard.

PERSONAL PROTECTIVE EQUIPMENT: Proper protective equipment should be used.

Small Spills: Wear rubber gloves, splash goggles, and appropriate body protection.

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:** Full-face or half-mask, air purifying respirators (NIOSH approved); hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls); coveralls; gloves, outer, chemical-resistant; gloves, inner, chemical-resistant; boots (outer), chemical-resistant steel toe and shank; boot-covers, outer, chemical-resistant (disposable); hard hat; escape mask; face shield.

METHODS FOR CLEAN-UP AND CONTAINMENT: Eliminate all sources of ignition before cleanup begins.

Small Spills: Absorb spilled liquid with paper towels or other suitable absorbent materials. Wash contaminated area with soap and water, absorb with paper towels, and rinse with water. Place spill material and all clean-up materials in appropriate container for disposal.

Large Spills: Dike spill to prevent spread. Absorb spill with polypads or other non-reactive material. Monitor area for combustible vapor levels from potential and confirm levels are bellow exposure limits given in Section 8 (Exposure Controls-Personal Protection), if applicable, before non-response personnel are allowed into the spill area. Place spill material and all clean-up materials in appropriate container for disposal. Decontaminate area thoroughly.

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

ENVIRONMENTAL PRECAUTIONS: Avoid release to the environment. Run-off water may be contaminated by other materials and should be contained to prevent possible environmental damage. Spills on water can cover water surface and cause oxygen-deprivation in the aquatic environment, as well as coat marine life. All effort must be made to avoid spills to the marine environment.

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

7. HANDLING and USE

PRECAUTIONS FOR SAFE HANDLING: All employees who handle this material should be trained to handle it safely. As with all chemicals, avoid getting this product ON YOU or IN YOU. Use in a well-ventilated location, segregated from other materials and operations. Minimize all exposure to this substance, including airborne aerosols. Do not eat, drink, smoke, or apply cosmetics while handling this product. Remove contaminated clothing immediately. Wash thoroughly after handling this product. Containers of this product must be properly labeled. Use non-sparking tools. Bond and ground containers during transfers of material. Spills of this product on certain surfaces may present a slip hazard.

GHS Statements for Safe Handling: P261: Avoid breathing mists or sprays. P264: Wash thoroughly all contaminated portions of the body after handling. P270: Do not eat, drink or smoke when using this product. P280: Wear protective gloves, protective clothing, eye protection, face protection.

CONDITIONS FOR SAFE STORAGE: Keep away from heat, sparks, and other sources of ignition. Keep from freezing. Keep away from food and drinking water. Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible.

7. HANDLING and USE (Continued)

CONDITIONS FOR SAFE STORAGE (continued): Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Containers should be separated from oxidizing materials by a minimum distance of 20 ft. or by a barrier of non-combustible material at least 5 ft. high having a fire-resistance rating of at least 0.5 hours. Storage areas should be made of fire-resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Have appropriate extinguishing equipment in the storage area (e.g., sprinkler system, portable fire extinguishers). Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Refer to NFPA 30, *Flammable and Combustible Liquids Code*, for additional information on storage. Empty containers may contain residual liquid or vapors that are flammable; therefore, empty containers should be handled with care.

GHS Statements for Safe Storage: P405: Store locked up.

SPECIFIC END USE(S): This product is an additive for oils, fuels and ATF. Follow all industry standards for use of this product.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment thoroughly, before maintenance begins. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures, or applicable standards.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

Ventilation and Engineering Controls: Use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits provided in this section, if applicable. Exhaust directly to the outside, taking necessary precautions for environmental protection. An eyewash and safety shower should be readily accessible.

Occupational Exposure Limits: References are only to those components with published exposure limits.

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR							
		ACGIH-TLVS		OSHA-PELs		NIOSH-RELs		NIOSH	OTHER
		TWA mg/m^3	STEL mg/m^3	TWA mg/m^3	STEL mg/m^3	TWA mg/m^3	STEL mg/m^3	IDLH mg/m^3	mg/m^3
Severely Hydrotreated Naphthenic Oil Exposure limits given are for related Mineral Oil, pure and highly and severely refined; and	64742-53-6	5 (inhal. fract.)	NE	NE	NE	NE	NE	NE	DFG MAKs: TWA: 5 (resp. fract.) PEAK: 4●MAK, excursion factor 2, 15 min. average value, 4 per shift, 1-hr interval Carcinogen: IARC-3 (highly refined), TLV-A4
Oil Mist, Mineral (CAS# 8012-95-1)		See Above	NE	5	NE	5	10	NE	NE

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

International Exposure Limits: Currently, there are no international exposure limits are in place components of this product. In many jurisdictions, exposure limits are similar to the U.S. ACGIH TLVs or U.S. OSHA PELs. Since a TLV or PEL has not been established for these substance, appropriate government agencies in each jurisdiction should be consulted to determine which regulations apply.

ACGIH Biological Exposure Indices (BEIs): Currently, there are no Biological Exposure Indices determined for the components of this product.

PERSONAL PROTECTIVE EQUIPMENT: The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132, including U.S. Federal OSHA Respiratory Protection (29 CFR 1910.134), OSHA Eye Protection 29 CFR 1910.133, OSHA Hard Protection 29 CFR 1910.138, OSHA Foot Protection 29 CFR 1910.136 and OSHA Body Protection 29 CFR1910.132), equivalent standards of Canada (including CSA Respiratory Standard Z94.4-02, Z94.3-M1982, *Industrial Eye and Face Protectors* and CSA Standard Z195-02, *Protective Footwear*), standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand/body protection, and CR 13464:1999 for face/eye protection). Please reference applicable regulations and standards for relevant details.

Respiratory Protection: Respiratory protection is not normally needed during use of this product during normal use and handling of the product. Maintain airborne contaminant concentrations below exposure limits listed in this section, if applicable. If respiratory protection is needed refer to applicable standards above. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

Eye Protection: Not normally needed for handling of small quantities. If handling more than several ounces, wear splash goggles or safety glasses. If necessary, refer to applicable standards given at the beginning of this section.

Hand Protection: Wear rubber or other appropriate glove to avoid skin contact. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this SDS. If necessary, refer to applicable standards given at the beginning of this section.

Body Protection: Coveralls or apron when handling large quantity. If necessary, refer to applicable standards given at the beginning of this section.

9. PHYSICAL and CHEMICAL PROPERTIES

FORM: Liquid.
COLOR: Dark red/burgundy.
ODOR: Petroleum oil.
ODOR THRESHOLD: Not established.
VAPOR DENSITY (air = 1): Not available.
VAPOR PRESSURE: Not available.
BOILING POINT: Not available.
FREEZING POINT: Not available.
SPECIFIC GRAVITY (water = 1): 0.883
pH: Not available.
FLASH POINT (TCC): > 93°C (> 199.4°F)
AUTOIGNITION TEMPERATURE: Not available.
FLAMMABIITY: Combustible.
FLAMMABILITY LIMITS IN AIR: Not available.
CORROSIVITY: Not corrosive.
OXIDIZING PROPERTIES: Not an oxidizer.
SOLUBILITY IN WATER: Insoluble
OTHER SOLUBILITIES: Not available.
LOG COEFFICIENT WATER/OIL DISTRIBUTION: Not determined.
HOW TO DETECT THIS SUBSTANCE (identification properties): The appearance or odor may be a method to identify this product in event of an accidental release.

10. STABILITY and REACTIVITY

REACTIVITY/CHEMICAL STABILITY: This product is stable under normal conditions.
DECOMPOSITION PRODUCTS: Combustion: Carbon, sulfur, nitrogen and phosphorus oxides, reactive hydrocarbons and polycyclic aromatic hydrocarbons (PAHs). **Hydrolysis:** None.
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is incompatible with strong oxidizing agents.
POSSIBILITY OF HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Contact with incompatible materials, and exposure to excessive temperatures.

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational exposure are anticipated to be by inhalation, skin and eye contact. The following symptoms of exposure to this product are anticipated to be as follows:

Inhalation: Inhalation of vapors, mists or sprays from this product may irritate the tissues of the nose, mouth, throat, and upper respiratory system. Symptoms are expected to dissipate after removal to fresh air.

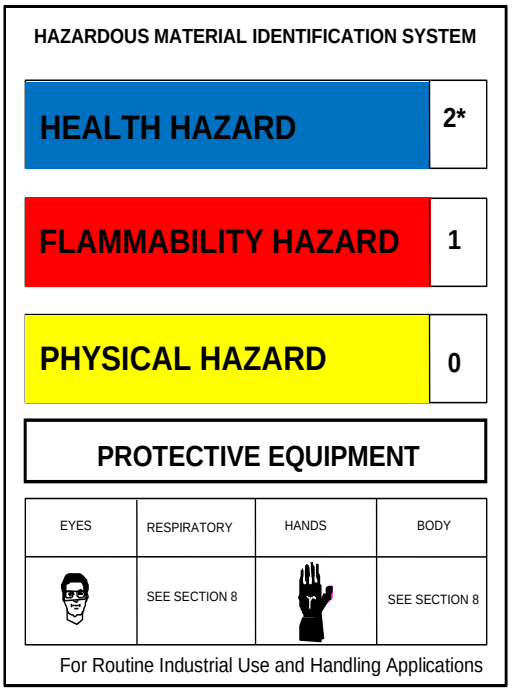
Contact with Eyes: Eye contact may be mildly irritating and cause redness and tearing. Contact with skin and eyes will temporarily stain contaminated tissues.

Contact with Skin: Skin contact with this product may be irritating, especially if prolonged. Chronic or repeated skin exposure may cause dermatitis (dry, red, itchy skin). Contact with skin and eyes will temporarily stain contaminated tissues. Some evidence indicates that repeated or chronic skin contact with the Severely Hydrotreated Naphthenic Oil component may cause adverse effects on the adrenal glands and bones.

Skin Absorption: The Severely Hydrotreated Naphthenic Oil component may be absorbed via intact skin causing adverse system effects.

Ingestion: Ingestion is not anticipated to be a likely route of occupational exposure for this product. If this product is swallowed, irritation of the gastrointestinal system may occur. Aspiration into the lungs after ingestion can cause potentially fatal oil-induced chemical pneumonia and edema.

Injection: Injection is not anticipated to be a significant route of exposure for this product. If this product is "injected" (as may occur through punctures by contaminated, sharp objects), local swelling and irritation can occur.



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

DELAYED AND IMMEDIATE EFFECTS AND CHRONIC EFFECTS FROM SHORT AND LONG-TERM EXPOSURE: Exposure to this product may cause the following health effects**:**

Acute/Short-Term: Contact via inhalation and skin or eye contact may cause irritation. Ingestion may be harmful or lead to aspiration into the lungs. Skin and eye contact will temporarily stain contaminated tissues.

Chronic/Long-Term: Chronic skin contact may cause dermatitis. Long-term exposure to the product may cause adverse effects on the adrenal system and bones.

TARGET ORGANS:

Acute: Skin, eyes, respiratory system.
Chronic: Skin, adrenal glands, bones.

PRODUCT ACUTE TOXICITY ESTIMATES (ATE): Due to the lack of data for the main component, it is not possible calculate ATEs by any route.

TOXICITY DATA for COMPONENTS: Currently, there are no toxicity data for the Severely Hydrotreated Naphthenic Oil. There are data for Lightly Hydrotreated Naphthenic Oil, which has the same CAS#, but not for the Severely Hydrotreated form of this compound. The following are toxicity data for the Proprietary Yellow Colorant.

Proprietary Yellow Pigment:
TDLo (Intravenous-Man) 14 mg/kg/10 minutes-intermittent: Cardiac: arrhythmias (including changes in conduction)
TDLo (Intravenous-Man) 7142 µg/kg: Sense Organs and Special Senses (Eye): hemorrhage; Gastrointestinal: nausea or vomiting

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

Proprietary Yellow Pigment (continued):

LD_{50} (Oral-Rat) 6721 mg/kg: Behavioral: changes in motor activity (specific assay), ataxia; Lungs, Thorax, or Respiration: dyspnea

LD_{50} (Oral-Mouse) 4738 mg/kg: Behavioral: changes in motor activity (specific assay), ataxia; Lungs, Thorax, or Respiration: dyspnea

LD_{50} (Intravenous-Rat) 1 gm/kg: Blood: other changes

LD_{50} (Intravenous-Mouse) 1 gm/kg

LD_{50} (Intravenous-Dog) 1 gm/kg: Gastrointestinal: changes in structure or function of salivary glands

LDLo (Intraperitoneal-Guinea Pig) 1 gm/kg

TDLo (Intravenous-Rat) 4 gm/kg/28 days-intermittent: Blood: pigmented or nucleated red blood cells

TDLo (Intravenous-Dog) 4 gm/kg/28 days-intermittent: Gastrointestinal: nausea or vomiting; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: transaminases; Related to Chronic Data: death

TDLo (Intravenous-Rabbit) 933 mg/kg: female 5-8 day(s) after conception: Reproductive: Maternal Effects: postpartum; Effects on Newborn: viability index (e.g., # alive at day 4 per # born alive)

TDLo (Subcutaneous-Rat) 19 gm/kg/79 weeks-intermittent: Tumorigenic: equivocal tumorigenic agent by RTECS criteria, tumors at site of application

TDLo (Subcutaneous-Rat) 16 gm/kg/1 year-intermittent: Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Skin and Appendages: tumors; Tumorigenic: tumors at site of application

DNA Adduct (Bacteria-*Escherichia coli*) 15 µmol/L

Mutation in Mammalian Somatic Cells (Mouse Lymphocyte) 200 mg/L

Sister Chromatid Exchange (Hamster Ovary) 50,100 µg/L

CARCINOGENIC POTENTIAL: The Severely Hydrotreated Naphthenic Oil component is listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

SEVERELY HYDROTREATED NAPHTHENIC OIL: ACGIH TLV-A4: (Not Classifiable as to Human Carcinogenicity); IARC-3 (Unclassifiable as to Carcinogenic in Humans)

Under GHS hydrocarbons that contain less than 3% DMSO extract by weight (w/w) are not classified as carcinogenic. According to the supplier SDS for the Severely Hydrotreated Naphthenic Oil component, this hydrocarbon does not contain DMSO extract of 3% or more, so a carcinogenic classification is not applicable under GHS.

The remaining components of this product are not specifically listed by U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, IARC, GERMAN MAK, and ACGIH and therefore is not considered to be, nor suspected to be cancer causing agents by these agencies.

IRRITANCY OF PRODUCT: This product may be irritating to contaminated tissue.

SENSITIZATION TO THE PRODUCT: No component of this product is known to be a human skin or respiratory sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: The components of this product are not reported to produce mutagenic, embryotoxic, teratogenic or reproductive effects in humans. A notified EU ECHA classification has been published that gives the Severely Hydrotreated Naphthenic Oil component (by CAS#) a reproductive toxicity classification. However, the following information in the EU ECHA database indicates reproductive toxicity is unlikely.

In a rat dermal OECD 414 study with a lubricating base oil (CAS no 64741-88-4) there was no evidence of teratogenicity. There were no treatment-related changes observed during the external, skeletal, or visceral evaluations. Mean fetal weight and crown-rump lengths were comparable across all dose groups. A developmental NOAEL was reported to be ≥2000 mg/kg/day.

A second dermal OECD 414 study with a lubricating base oil (CAS no 64742-65-0) used dose levels of 0 and 1000 mg/kg/day with application on gestation days 0 to 19. There was no maternal or developmental toxicity at the limit dose of 1000 mg/kg/day. This is a robust GLP guideline study conduct recently and at the limit dose.

These two studies show that prior to refining, the petroleum stream has no developmental toxicity; this is considered to be a worst case, after refining the petroleum stream has fewer PAH molecules. It should be noted that although the studies are dermal, one of them uses radioactive substance to demonstrate that the fetus is exposed.

Other studies also confirm the lack of developmental toxicity in similar petroleum streams;

An oral OECD 414 study with a highly refined white mineral oil (CAS no 8042-47-5, predominantly C12 to C50), found no developmental or maternal toxicity at 5000 mg/kg/day, it should be noted that this is five times higher than the limit dose of 1000 mg/kg/day.

In addition, there are two Gas-to Oil oral prenatal development toxicity study, which can be used to inform us about the non-PAH components of LBO, a gas oil and a base oil (Boogaard et al 2017). In both studies the test material was administered by oral gavage and in both studies, there was no effect on fetal development. The developmental toxicity NOEL for the gas oil was 750 mg/kg/day and for the base oil 1000 mg/kg/day; in both substances this was the highest dose tested. The gas oil contains branched and linear C8-C25 distillates and the base oil C18-C50 branched cyclic and linear distillates; these results indicate that the long chain hydrocarbons also present in LBO are not associated with developmental toxicity.

These studies demonstrate that a less refined substance (LBO), a more refined substance (HRBO), plus GTL products with no PAH's, have no effect on fetal development following systemic exposure. In the absence of any triggers with this substance, and similar (even less refined) substances further testing on vertebrate animals for this substance can be omitted.

Taken together it is considered that the above provides sufficient evidence to conclude that LBO are unlikely to alter fetal development

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil; it is expected to be highly mobile.

PERSISTENCE AND BIODEGRADABILITY: No specific data are available this product.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential.

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. Release to waterways may result in fouling of the water.

RESULTS OF PBT and vPvB ASSESSMENT: No data available. PBT and vPvB assessments are part of the chemical safety report required for some substances in European Union Regulation (EC) 1907/2006, Article 14.

OTHER ADVERSE EFFECTS: The components of this product are not listed as having 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.

GHS Statements for Environmental Exposure Control: Not applicable.

13. DISPOSAL CONSIDERATIONS

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

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

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

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

U.S. EPA WASTE NUMBER: Not applicable.

EWC WASTE CODES: 16 05 08: Discarded Organic Chemicals Consisting of or Containing Dangerous Substances.

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION 49 CFR 172.101: This material is not classified as Dangerous Goods, per regulations of the DOT.

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.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This product is not classified by the Economic Commission for Europe to be dangerous goods.

TRANSPORT IN BULK ACCORDING TO THE IBC CODE: See the information under the individual jurisdiction listings for IBC information.

ENVIRONMENTAL HAZARDS: This product does not meet the criteria of environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID, and ADN); components of this product are not specifically listed in Annex III under MARPOL 73/78.

15. REGULATORY INFORMATION

UNITED STATES REGULATIONS:

U.S. SARA Reporting Requirements: The components of this product are not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA Threshold Planning Quantity (TPQ): The components of this product have no specific Threshold Planning Quantity. The default Federal SDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

U.S. CERCLA Reportable Quantity (RQ): Not applicable.

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

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

Other U.S. Federal Regulations: Not applicable.

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): This product does not contain any components listed on the California Proposition 65 Lists.

CANADIAN REGULATIONS:

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

Canadian Environmental Protection Act (CEPA) Priorities Substances Lists: Not applicable.

Canadian WHMIS HPR 2015 Classification and Symbols: See the following section for classification and symbols under WHMIS.

EUROPEAN REGULATIONS:

Safety, Health, and Environmental Regulations/Legislation Specific for The Product: Currently, there is no specific legislation pertaining to this product.

Chemical Safety Assessment: No data available. The chemical safety assessment is required for some substances according to European Union Regulation (EC) 1907/2006, Article 14.

16. OTHER INFORMATION

GLOBAL HARMONIZATION CLASSIFICATION FOR COMPONENTS:

Proprietary Yellow Colorant: U.S. OSHA Classification Only: Combustible Dust Hazard

Severely Hydrotreated Naphthenic Oil: This is a notified classification.

Classification: Aspiration Toxicity Category 1, Specific Target Organ Toxicity (Dermal-Adrenal Glands, Bones) Repeated Exposure Category 2

Hazard Statements: H304: May be fatal if swallowed and enters airways. H372: Causes damages to bones and adrenal glands through prolonged or repeated exposure by skin contact.

16. OTHER INFORMATION (Continued)

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:

April 2011: Review and up-date entire SDS. Revise format to include current ANSI 16 Part format, Canadian, European and Global Harmonization compliance.
June 2018: Review and up-date of entire SDS and up-date as necessary. Change of company name.
Oct. 8, 2018: Replaced 'Pigment' with 'Colorant'.
December 2020: Review and up-date entire SDS for currency and up-date to current requirements under U.S. OSHA, Canadian WHMIS and EU GHS regulations.

MIXTURES: When two or more chemicals are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for this product before you use the product. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember all chemicals have properties that can cause serious injury or death.

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

DEFINITION OF TERMS

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

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

EXPOSURE LIMITS IN AIR:

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

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 not to be significant.

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

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

LOQ: Limit of Quantitation.

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

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 a 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.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

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 LD_{50} Rat*: > 5000 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 2000 mg/kg. *Inhalation Toxicity 4-hrs LC_{50} 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 LD_{50} Rat*: > 500–5000 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 1000–2000 mg/kg. *Inhalation Toxicity LC_{50} 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 LD_{50} Rat*: > 50–500 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 200–1000 mg/kg. *Inhalation Toxicity LC_{50} 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 LD_{50} Rat*: > 1–50 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: > 20–200 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.05–0.5 mg/L. **4** Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposure; extremely toxic; irreversible injury may result from brief contact. *Skin Irritation*: Not appropriate. Do not rate as a 4, based on skin irritation alone. **4** Severe Hazard (continued): *Eye Irritation*: Not appropriate. Do not rate as a 4, based on eye irritation alone. *Oral Toxicity LD_{50} Rat*: ≤ 1 mg/kg. *Dermal Toxicity LD_{50} Rat or Rabbit*: ≤ 20 mg/kg. *Inhalation Toxicity LC_{50} 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. **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. 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).

DEFINITION OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): **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. Substances that readily undergo hazardous polymerization in the absence of inhibitors. **2** *Water Reactivity*: Materials that may react violently with water. *Organic Peroxides*: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change but will not detonate. These materials may also react violently with water. *Explosives*: Division 1.4 explosives. Explosive substances where the explosive effects are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases*: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group II oxidizers. Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential (or low risk) for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature. **3** *Water Reactivity*: Materials that may form explosive reactions with water. *Organic Peroxides*: Materials that are capable of detonation or explosive reaction but require a strong initiating source or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives*: Division 1.3 explosives. Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases*: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group I oxidizers. Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. Liquids: any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture.

PHYSICAL HAZARD (continued): **3 (continued):** *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 LC_{50} for acute inhalation toxicity greater than 10,000 ppm. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 200 mg/L. Materials with an LD_{50} for acute dermal toxicity greater than 2000 mg/kg. Materials with an LD_{50} 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 LC_{50} for acute inhalation toxicity greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists with an LC_{50} for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L. Materials with an LD_{50} 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 LD_{50} 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 LC_{50} 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 LC_{50} for acute inhalation toxicity, if its LC_{50} 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 LC_{50} for acute inhalation toxicity greater than 2 mg/L but less than or equal to 10 mg/L.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

HEALTH HAZARD (continued): **2 (continued):** Materials with an LD_{50} 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 LD_{50} for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. **3** Materials that, under emergency conditions, can cause serious or permanent injury. Gases with an LC_{50} 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 LC_{50} for acute inhalation toxicity, if its LC_{50} 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 LC_{50} for acute inhalation toxicity greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials with an LD_{50} 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 with an LD_{50} 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 LD_{50} 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 LC_{50} 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 LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 1000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD_{50} for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD_{50} 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.

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.

DEFINITION OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

INSTABILITY HAZARD (continued): **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures. Materials that have an instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. **3** Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point: Minimum temperature at which a liquid gives off sufficient vapor to form an ignitable mixture with air near the surface of the liquid or within the test vessel used. Autoignition Temperature: Minimum temperature of a solid, liquid, or gas required to initiate or cause self-sustained combustion in air with no other source of ignition. LEL: Lowest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame. UEL: Highest concentration of a flammable vapor or gas/air mixture that will ignite and burn with a flame.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. LD_{50}: 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/m^3: 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. TDo, LDLo, and LDo, or TC, TCo, LCLo, and LCo: Lowest dose (or concentration) to cause lethal or toxic effects.

TOXICOLOGICAL INFORMATION (continued):

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.

ECOLOGICAL INFORMATION:

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

REGULATORY INFORMATION:

U.S.:

EPA: U.S. Environmental Protection Agency. ACGIH: American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. OSHA: U.S. Occupational Safety and Health Administration. NIOSH: National Institute of Occupational Safety and Health, which is the research arm of OSHA. DOT: U.S. Department of Transportation. 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.