



# MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

## BASIC CHEMICAL SOLUTIONS

### **PART I** *What is the material and what do I need to know in an emergency?*

#### 1. PRODUCT IDENTIFICATION

**TRADE NAME (AS LABELED):** **BCS POWDERED CAUSTIC CLEANER HD**

**CHEMICAL NAME/CLASS:** Inorganic Solid Mixture

**PRODUCT USE:** Cleaner

**SUPPLIER/MANUFACTURER'S NAME:** **BASIC CHEMICAL SOLUTIONS, L.L.C.**

**ADDRESS:** **Corporate Office**  
535 Seaport Blvd  
Redwood City CA, 94063

**BUSINESS PHONE:** 1-315-789-3054

**EMERGENCY PHONE:** **CHEMTREC: 1-800-424-9300**

**DATE OF PREPARATION:** October 19, 1998

**DATE OF REVISION:** March 9, 2009

#### 2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH mg/m <sup>3</sup>	OTHER
			TLV mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	PEL mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>		
Sodium Hydroxide	1310-73-2	75-95	NE	2, C	NE	2, C (Vacated 1989 Pels)	10	NIOSH Rel: 2 mg/m <sup>3</sup> DFG MAK: 2 mg/ m <sup>3</sup>
Sodium Tripolyphosphate	7758-29-4	5-15	NE	NE	NE	NE	NE	NE
Detergent Mixture	NE	1-5	NE	NE	NE	NE	NE	NE

NE = Not Established      C = Ceiling Limit      mppcf: Millions of Particles per Cubic Foot      See Section 16 for Definitions of Terms Used  
 NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

### 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW:** This product is an amber solid. The product presents a moderate health hazard, in terms of irritation and reddening of the skin, eyes, or other contaminated tissue. This product is not flammable. This Product is reactive with Acids and Water. In the event of a fire or spill, adequate precautions must be taken. Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

**SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE:** The most significant routes of occupational over-exposure are inhalation and contact with skin and eyes. The symptoms of over-exposure to this product, by route of exposure, are as follows:




**INHALATION:** If dusts of this product are inhaled, they may irritate the nose, throat, and lungs. Inhalation may result in coughing, sneezing, nasal congestion, sore throat and breathing difficulty.

**CONTACT WITH SKIN or EYES:** Depending on the duration of over-exposure, contact with the eyes will cause irritation, pain, tissue damage, reddening and may result in blindness. Depending on the duration of over-exposure, skin contact may cause burns, reddening, discomfort, and mild to moderate irritation.

**SKIN ABSORPTION:** Skin absorption is not known to be a significant route of exposure for this product.

**INGESTION:** Ingestion is not anticipated to be a likely route of occupational exposure for this product. If this product is swallowed, it will cause burning and irritation of the mouth, throat, esophagus, and other tissues of the digestive system. Ingestion of large quantities may be fatal.

**INJECTION:** Accidental injection of this product, via puncture by a contaminated object, will result in local reddening, tissue swelling, discomfort and chemical burns.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	3
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	1
PROTECTIVE			D
EYES	RESPIRATOR	HAND	BODY
	SEE SECTION		
For routine applications.			

**See Section 16 for Definition of Ratings**

**HEALTH EFFECTS OR RISKS FROM EXPOSURE:** An Explanation in **Lay Terms**. In the event of over-exposure, the following symptoms may be observed:

**ACUTE:** This product is corrosive and can burn and damage skin, eyes, mucous membranes and any other exposed tissue. If inhaled, irritation of the respiratory system may occur with coughing and difficulty breathing. Though unlikely to occur during occupational use, ingestion of large quantities or severe inhalation overexposures may be fatal.

**CHRONIC:** Chronic skin contact may result in dermatitis (inflammation and reddening of the skin) and allergic skin reactions. Refer to Section 11 (Toxicological Information) for Additional Data.

**TARGET ORGANS:** Skin, eyes.

## PART II *What should I do if a hazardous situation occurs?*

### 4. FIRST-AID MEASURES

**SKIN EXPOSURE:** If Product contaminates the skin, remove as much solid as possible by brushing off the affected area and then **immediately** begin contamination with running water. Minimum flushing is for 15 minutes. Remove contaminated clothing, taking care not to contaminate eyes. Victim must seek medical attention if adverse effects occur.

**EYE EXPOSURE:** If this Product enters the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

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

**INGESTION:** If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advise is not available, do not induce vomiting. Victim should drink milk, egg whites or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions or unable to swallow. Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention of necessary. Take a copy of the label and MSDS to health professional with victim.

## 5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.

AUTOIGNITION TEMPERATURE: Not flammable.

FLAMMABLE LIMITS (in air by volume, %):  
Lower (LEL): Not applicable.  
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: NO      Carbon Dioxide: YES  
Foam: YES      Dry Chemical: YES  
Halon: NO      Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This Product is a Corrosive Alkali and presents a significant contact hazard to firefighters. Though the product is not flammable, it can react with water to release heat and to cause spattering. When involved in a fire, this material may decompose and produce

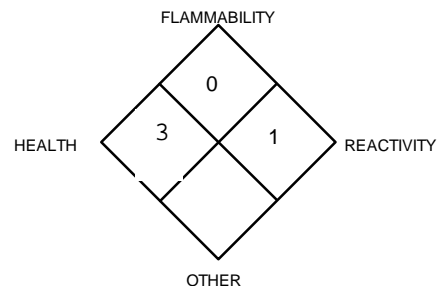
caustic vapors.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move fire-exposed containers if it can be done without risk to firefighters. If possible, firefighters should control run-off water to prevent environmental contamination. Rinse contaminated equipment with soapy water before returning such equipment to service.

### NFPA RATING



**See Section 16 for  
Definition of Ratings**

## 6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Responders should wear gloves, goggles, and suitable body protection during the clean-up of small spills. Larger, uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a large spill, clear the affected area, protect people, and respond with trained personnel. Minimum Personal Protective Equipment should be **Level C: triple-gloves (rubber gloves and nitrile gloves, over latex gloves), chemically resistant suit and boots, hard-hat, and Air-Purifying respirator with high efficiency particulate filter**. **Self-Contained Breathing Apparatus must be selected if releases which occur in confined or poorly-ventilated areas, or in situations in which the level of oxygen is below 19.5%**. Sweep-up or vacuum spilled solid. Rinse area with soap and water solution, followed by a water rinse.

Close-off sewers and take other measures to protect human health and the environment, as necessary. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. Dispose of in accordance with applicable U.S. Federal, State, or local procedures and appropriate Canadian standards (see Section 13, Disposal Considerations).

## PART III *How can I prevent hazardous situations from occurring*

### 7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing particulates generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Open containers slowly on a stable surface. Containers of this product must be properly labeled. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. Use in work areas which can be easily decontaminated. 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). Material should be stored in secondary containers. Keep container tightly closed when not in use. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged.

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## 7. HANDLING and STORAGE (Continued)

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, if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures and appropriate Canadian standards.

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## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use adequate ventilation to ensure exposures are below those in section 2 (Composition and Information on Ingredients). Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable U.S. State regulations (or the applicable standards of Canada and its Provinces). Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown.

EYE PROTECTION: Splash goggles or safety glasses. Wear face shields when using more than 1 pound of this product or in operations where dusts can be generated.

HAND PROTECTION: Wear Neoprene Rubber gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task. An apron or other impermeable body protection is suggested. Full-body chemical protective clothing is recommended for emergency response procedures.

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## 9. PHYSICAL and CHEMICAL PROPERTIES

Unless otherwise specified, the following information is for Sodium Hydroxide, the main component of this product.

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

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

SOLUBILITY IN WATER: Soluble.

BOILING POINT: Not applicable.

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

pH: 12-14 (1% solution)

ODOR THRESHOLD: Not available.

LOG WATER/OIL DISTRIBUTION COEFFICIENT: Not available.

The following information is for this product.

APPEARANCE AND COLOR: This product is an amber solid with a mild odor.

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## 10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Caustic Vapors.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Acids and Water.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Heat, contact with incompatible materials.

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## PART IV *Is there any other useful information about this material?*

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## 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components greater than 1 percent in concentration is provided below.

### **SODIUM HYDROXIDE:**

Oral-Rat LD<sub>50</sub>: 6500 mg/kg; 3900 mg/kg, 4100 mg/kg

Subcutaneous-Rat LD<sub>50</sub>: 2060 mg/kg

Intraperitoneal-Rat LD<sub>50</sub>: 1780 mg/kg

Oral-Mouse LD<sub>50</sub>: 3210 mg/kg

Subcutaneous-Mouse LD<sub>50</sub>: 1260 mg/kg

Intraperitoneal-Mouse LD<sub>50</sub>: 940 mg/kg

### **SODIUM TRIPOLYPHOSPHATE**

Eye Irritancy (monkey) = 1% solution, 24 hr, Severe.

Skin Irritancy (rabbit) = 500 mg, 24 hr, Severe.

Eye Irritancy (rabbit) = 4 g, Mild.

Eye Irritancy (rabbit) = 1% solution, Severe.

Eye Irritancy (rabbit) = 50 µg, 24 hr, Severe.

Eye Irritancy (rabbit) = 1 mg, 24 hr, Severe.

Eye Irritancy (rabbit) = 100 mg with rinse, Severe.

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Cytogenic Analysis System (grasshopper, parenteral) = 20 mg  
LD<sub>50</sub> (intraperitoneal, mouse) = 40 mg/kg.  
LDLo (oral, rabbit) = 500 mg/kg.

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## 11. TOXICOLOGICAL INFORMATION—CONTINUED

IRRITANCY OF PRODUCT: This product is severely irritating to contaminated tissue and can cause chemical burns.

SENSITIZATION TO THE PRODUCT: May cause allergic skin reactions (e.g.— dermatitis, rashes) upon repeated contact overexposures.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: Human mutation data are reported for Sodium Nitrotriacetate and Sodium Sulfite, components of this product; the data were obtained from clinical studies of specific tissues exposed at relatively high concentrations.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.

Teratogenicity: This product is not reported to cause teratogenic effects in humans. Teratogenicity data are reported for Sodium Sulfate, a component of this product; the data were obtained from clinical studies of test animals exposed at relatively high doses.

Reproductive Toxicity: This product is not reported to cause reproductive effects in humans.

*A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (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 which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.*

ACGIH BIOLOGICAL EXPOSURE INDICES: Currently, there are no ACGIH Biological Exposure Indices (BEIs) associated with the components of this product.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Skin disorders can be aggravated by over-exposure to this product. Inhalation of this Product may aggravate respiratory conditions. Additionally, disorders involving the "Target Organs" (see Section 3, Hazard Identification) may also be aggravated by overexposures.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure to this product.

BIOLOGICAL EXPOSURE INDICES: Currently, Biological Exposure Indices (BEI's) are not applicable to components of this Product.

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## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product are relatively stable in the environment; they may degrade, after time, into other organic and inorganic constituents.

SODIUM HYDROXIDE: K<sub>ow</sub> = too low to be measured. Water Solubility = 9 g/0.9 ml. water. BOD: None

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product is harmful to plant and animal life if released into the environment. As with all chemicals, work practices should be aimed at eliminating environmental releases. Refer to Section 11 (Toxicological Information) for further toxicological data.

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## 12. ECOLOGICAL INFORMATION—CONTINUED

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product can substantially raise the pH of an Aquatic Environment and can be extremely toxic to fish and aquatic plants. The following aquatic toxicity data are available for the components of this Product.

SODIUM HYDROXIDE:

LC<sub>100</sub> (*Cyprinus carpio*) = 180 ppm/24 hr/25 °C

TL<sub>m</sub> (mosquito fish) = 125 ppm/96 hr (fresh water)

TL<sub>m</sub> (bluegill) = 99 mg/L/48 hr (tap water)

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### 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada and its Provinces. 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.

EPA WASTE NUMBER: Not applicable.

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### 14. TRANSPORTATION INFORMATION

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

PROPER SHIPPING NAME: Sodium Hydroxide, Solid

HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive Material)

UN IDENTIFICATION NUMBER: UN-1823

PACKING GROUP: II

DOT LABEL(S) REQUIRED: Corrosive

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 154

MARINE POLLUTANT: This product is not designated by the DOT to be a Marine Pollutant (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS NOT CONSIDERED AS DANGEROUS GOODS.

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### 15. REGULATORY INFORMATION

#### ADDITIONAL U.S. REGULATIONS:

COMPONENT	SARA 302	SARA 304	SARA 313
Sodium Hydroxide	No	Yes	No

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Sodium Hydroxide = 1000 Pounds

U.S. TSCA INVENTORY STATUS: The chemicals in this product are listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

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## 15. REGULATORY INFORMATION (Continued)

U.S. STATE REGULATORY INFORMATION: Components of this product are covered under specific State regulations, as denoted below:

**Alaska - Designated Toxic and Hazardous Substances:** None.

**California - Permissible Exposure Limits for Chemical Contaminants:** None.

**Florida - Substance List:** None.

**Illinois - Toxic Substance List:** None.

**Kansas - Section 302/313 List:** None.

**Massachusetts - Substance List:** None.

**Michigan - Critical Materials Register:** None.

**Minnesota - List of Hazardous Substances:** None.

**Missouri - Employer Information/Toxic Substance List:** None.

**New Jersey - Right to Know Hazardous Substance List:** None.

**North Dakota - List of Hazardous Chemicals, Reportable Quantities:** None.

**Pennsylvania - Hazardous Substance List:** None.

**Rhode Island - Hazardous Substance List:** None.

**Texas - Hazardous Substance List:** None.

**West Virginia - Hazardous Substance List:** None.

**Wisconsin - Toxic and Hazardous Substances:** None.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is on the California Proposition 65 lists.

ANSI LABELING (Z129.1): **DANGER!** CORROSIVE MATERIAL. CAN CAUSE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. MAY CAUSE LUNG DAMAGE. REACTS WITH WATER AND ACIDS. AVOID SPATTERING BY SLOWLY ADDING TO SOLUTION. Do not get into eyes, on skin or clothing. Avoid breathing dusts or particulates. Do not take internally. Use with adequate ventilation and employ respiratory protection when exposed to dusts. When handling, wear chemical splash goggles, face shield, rubber gloves and protective clothing. Do not transfer to unlabeled containers. Wash thoroughly after handling. Keep container closed when not in use. **FIRST-AID:** In case of contact, immediately flush skin or eyes for at least 15 minutes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use dry chemical, CO<sub>2</sub> or alcohol foam. **IN CASE OF SPILL:** Sweep-up or vacuum material. Refer to MSDS for additional information.

### **ADDITIONAL CANADIAN REGULATIONS:**

CANADIAN DSL/NDL INVENTORY STATUS: The chemicals in this product are on the DSL Inventory.

OTHER CANADIAN REGULATIONS: Not applicable.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this product are not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS SYMBOLS: **Class D2A:** Materials Causing Other Toxic Effects



## 16. OTHER INFORMATION

PREPARED BY:

BASIC CHEMICAL SOLUTIONS

THIS INFORMATION IS DRAWN FROM RECOGNIZED SOURCES BELIEVED TO BE RELIABLE. BASIC CHEMICAL SOLUTIONS MAKES NO GUARANTEES NOR ASSUMES ANY LIABILITY IN CONNECTION WITH THIS INFORMATION. THE USER SHOULD BE AWARE OF CHANGING TECHNOLOGY, RESEARCH, REGULATIONS AND ANALYTICAL PROCEDURES THAT MAY REQUIRE CHANGES HEREIN. THE ABOVE DATA IS SUPPLIED UPON THE CONDITION THAT PERSONS WILL EVALUATE THIS INFORMATION AND THEN DETERMINE ITS SUITABILITY FOR THEIR USE.

### DEFINITIONS OF TERMS

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

**CAS #:** This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

#### EXPOSURE LIMITS IN AIR:

**ACGIH** - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

**OSHA** - U.S. Occupational Safety and Health Administration.

**PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (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 which was vacated by Court Order. **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. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

#### HAZARD RATINGS:

**HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:** Health Hazard:

**0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

**NATIONAL FIRE PROTECTION ASSOCIATION:** Health Hazard: **0**

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

#### 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 vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air,

by volume, that will explode or ignite in the presence of an ignition source.

#### 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. Definitions of some terms used in this section are: **LD<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m<sup>3</sup>** 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. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **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** is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in life forms which consume contaminated plant or animal matter. Coefficient of Oil/Water Distribution is represented by **log K<sub>ow</sub>** or **log K<sub>oc</sub>** and 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** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA:** **CEPA** is the Canadian Environmental Protection Act. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDL** are the Canadian Domestic/Non-Domestic Substances Lists.