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CHEMETALL FOOTE CORPORATION
MATERIAL SAFETY DATA SHEET

LITHIUM ARSENITE SOLUTION

CFM 011

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SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHEMETALL FOOTE CORPORATION
348 HOLIDAY INN DRIVE
KINGS MOUNTAIN, NC 28086
704-739-2501 (8 AM - 5 PM M-F)

FOR EMERGENCY TRANSPORTATION
INFORMATION, CALL CHEMTREC
1-800-424-9300

SUBSTANCE: LITHIUM ARSENITE SOLUTION

TRADE NAMES/SYNONYMS: CFMNC106

PRODUCT CODES: Not applicable.

CHEMICAL FAMILY: Mixture Aqueous

FORMULAS: LiOH, LiAsO₂, H₂O

CREATION DATE: 5/11/96

REVISION DATE: 10/23/98

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

Component	CAS#	% w/w	Exposure Limits in Air				OTHER
			ACGIH		OSHA		
			TLV	STEL	PEL	STEL	
Lithium Hydroxide The following values are for Sodium Hydroxide, a compound with similar hazard properties.	1310-66-3	3-4	NE	2 mg/m ³ C	NE	2 mg/m ³ C	NIOSH: REL: 2 mg/m ³ C IDLH: 10 mg/m ³
Lithium Arsenite	72845-34-2	5-6	<u>As Arsenic inorganic compounds:</u> 0.01 mg/m ³ A1-Confirmed Human Carcinogen	NE	<u>As Arsenic inorganic compounds:</u> 0.01 mg/m ³	NE	EPA-A IARC-1 MAK-A1 NIOSH-X NTP-1 OSHA-1 TLV-A1
Water	7732-18-5	Balance	NE	NE	NE	NE	NE

NE = NE = Not Established. C = Ceiling Limit. 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.

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This is a odorless solution. This product can cause severe irritation and corrosive damage to the skin and eyes. Inhalation of this product's dusts can be severely irritating and damaging to the tissues of the nose, throat, and respiratory system. This product contains material (Lithium Arsenite) which can cause cancer in humans, risk of cancer depends on duration and level of exposure to this product. This product is not flammable and not reactive under most circumstances. Emergency responders must wear personal protective equipment appropriate to the situation to which they are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: In terms of anticipated occupational over-exposure situations for employees, the main health effect from over-exposure would be redness, severe irritation, and damage to contaminated skin and eyes (depending on the duration of the exposure).

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SECTION 3 HAZARDS IDENTIFICATION (Continued)

INHALATION: Inhalation of this product's fumes or vapors may severely irritate or damage the tissues of the eyes, nose, and respiratory system. Symptoms of such over-exposure can include coughing, sneezing, and a sore throat. Inhalation of relatively large quantities of this product may damage the tissues of the respiratory system, which can lead to the development of severe respiratory problems (i.e. breathing difficulty, chemical pneumonitis). Additionally, inhalation of arsenic compounds, such as Lithium Arsenite, a component of this product, can increase risk of lung cancer (depending on the duration and dose of exposure).

CONTACT WITH SKIN or EYES: This product can cause severe irritation and corrosive damage to the skin and eyes. Corneal damage and blindness may result if this product contaminates the eyes. Deep burns which are slow to heal, and which leave scar tissue, may result after skin over-exposures. Over-exposures to arsenic compounds, such as Lithium Arsenite, a component of this product can cause an increased risk to skin cancer. Additionally, symptoms of skin over-exposure to arsenic compounds can include weight loss, nausea, diarrhea, weakness, loss of appetite and skin lesions.

SKIN ABSORPTION: Skin absorption is not a significant route of exposure for any component of this product.

INGESTION: Though not anticipated to occur during routine occupational use situations, ingestion of this product can cause severe pain, burning of the mouth and throat, vomiting, and diarrhea. Severe ingestion over-exposures can cause collapse and death. Vomiting, which can occur after ingestion of this product, may lead to aspiration (which can cause lung damage). Ingestion of arsenic compounds, such as Lithium Arsenite, a component of this product may cause severe blood, heart and liver and kidney effects. Depending on the amount of arsenic ingested, symptoms of such over-exposure include nervousness, thirst, cyanosis, collapse and death.

INJECTION: Over-exposure via injection of this product can lead to pain and irritation at the point of injection, additionally, symptoms such as those described for "Skin or Eye Contact" may develop.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms.

ACUTE: In terms of occupational use situations, the chief health effect anticipated after over-exposure would be redness, severe irritation, or corrosive damage to contaminated skin and eyes. Ingestion of relatively large doses can be fatal. Inhalation of this product's mist or vapors may severely irritate or damage the tissues of the eyes, nose, and respiratory system (leading to such symptoms as coughing, sneezing, and breathing difficulty). This product contains material which can cause cancer in humans, risk of cancer depends on duration and level of exposure to this product.

CHRONIC: Dermatitis (cracking and reddening of the skin) may develop after prolonged or repeated skin contact with this product. Chronic over-exposure to arsenic compounds, such as Lithium Arsenite, a component of this product may cause an increased risk to lung and skin cancer.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATING: Health Hazard = 3; Fire Hazard = 0; Reactivity Hazard Rating = 0; PPE Rating = C

SECTION 4 FIRST-AID MEASURES

SKIN EXPOSURE: If this product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victims must seek immediate medical attention.

EYE EXPOSURE: If this product gets into 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. Victims must seek immediate medical attention.

INHALATION: If vapors of fumes 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 ingested, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice 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 who cannot swallow.

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

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SECTION 5 FIRE-FIGHTING MEASURES

FLASH POINT, °C (method): Not applicable.

AUTOIGNITION TEMPERATURE, °C: Not applicable.

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

FIRE EXTINGUISHING MATERIALS: This product is not flammable. Use fire extinguishing material appropriate for surrounding fires.

Water Spray: YES Carbon Dioxide: YES Foam: YES Dry Chemical: YES Halon: YES Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may decompose and produce irritating fumes and toxic gases (lithium compounds, arsine, and a variety of arsenic-containing compounds).

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 fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, fire-fighters should control run-off water to prevent environmental contamination.

NFPA RATING: Health Hazard = 3; Fire Hazard = 0; Reactivity Hazard Rating = 0.

SECTION 6 ACCIDENTAL RELEASE MEASURES

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

The minimum Personal Protective Equipment recommended for response to non-incident releases 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 should be worn in situations where the oxygen level is below 19.5 % or is unknown.**

Absorb spilled liquid with polypad, or other suitable absorbing agent. Use an agent to neutralize the caustic present in the solution. Avoiding the generation of mists or sprays. Decontaminate the area thoroughly. Test area with litmus paper to ensure than neutralization is complete. Place all spill residue in a suitable container and seal. Dispose of in accordance with Federal, State, and local solid waste disposal regulations (see Section 13, Disposal Considerations).

SECTION 7 HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Avoid getting this product ON YOU or IN YOU. Wash hands after handling this product. Remove contaminated clothing immediately. Use ventilation and other engineering controls to minimize potential exposure to this product. Where the levels of inorganic arsenic in the workplace exceed the action level (5 µg/m³), follow the regulations of the OSHA Inorganic Arsenic Standard (29 CFR 1910.1018). The Standard describes the requirements for exposure monitoring, hygiene facilities and practices, training, medical surveillance, and employee notifications.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing mists or sprays generated by this product. Always use this product in well-ventilated areas. Ensure containers of this product are properly labeled. Open containers slowly, on a stable surface. Close containers tightly after use. Wash thoroughly after using this material.

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). Periodically inspect containers of this product for leaks or damage. Empty containers may contain residual material; therefore, empty containers must be handled with care. Read instructions provided with the product prior to use. Based on the requirements of the Inorganic Arsenic Standard, the following sign must be posted in areas which exceed the OSHA action level for arsenic.

**DANGER
INORGANIC ARSENIC
CANCER HAZARD
AUTHORIZED PERSONNEL ONLY
NO SMOKING OR EATING
RESPIRATOR REQUIRED**

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SECTION 7 HANDLING AND STORAGE (Continued)

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely, as applicable. Always use this product in areas where adequate ventilation is provided. Neutralize residue with citric acid or other caustic neutralizing agent. Decontaminate equipment using soapy water before maintenance begins. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation, to ensure exposures are below limits provided in Section 2 (Composition and Information on Ingredients). Mechanical exhaust may be needed. Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance, the employer should provide an eye wash fountain within the immediate work area for emergency use.

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 State regulations. Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown. Where the levels of inorganic arsenic in the workplace exceed the action level ($5 \mu\text{g}/\text{m}^3$), follow the respiratory requirements of the OSHA Inorganic Arsenic Standard (29 CFR 1910.1018).

EYE PROTECTION: Splash goggles or safety glasses. Note: Additional protection, such as a face-shield, may be required for specific work-situations in which this product is used. The potential exposure hazards for each work situation must be evaluated, per 29 CFR 1910.132 (Federal OSHA Personal Protective Equipment Standard/General requirements), to determine the appropriate personal protective equipment for the operation.

HAND PROTECTION: Wear neoprene gloves for routine industrial use.

BODY PROTECTION: Use body protection appropriate for task (i.e. Apron or Tyvek suit).

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

VAPOR DENSITY: Not available. **EVAPORATION RATE (nBuAc=1):** Not available.
SPECIFIC GRAVITY: Not available. **FREEZING/MELTING POINT:** Not available.
SOLUBILITY IN WATER: Not available. **BOILING POINT:** Not available.
VAPOR PRESSURE, mm Hg @ 20 °C: Not available. **pH:** > 12.5
APPEARANCE AND COLOR: Odorless, colorless liquid.
HOW TO DETECT THIS SUBSTANCE (warning properties): The product does not have any unique warning properties. This product will turn litmus paper blue.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Relatively stable.
DECOMPOSITION PRODUCTS: Thermal decomposition of the components of this product include lithium compounds and arsine vapors.
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is not compatible with strong acids. Lithium hydroxide, a component of this product, is corrosive to aluminum, lead, and zinc.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Avoid mixing this product with incompatible chemicals.

SECTION 11 TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for the components of this product greater than 1 percent in concentration is available as follows:

LITHIUM HYDROXIDE:

Eye Irritation: In animal tests, solutions of lithium hydroxide are similar to solutions of sodium hydroxide, which can cause severe corrosive eye damage.

Short-Term Inhalation: In one study, rats were exposed to an aerosol, which was primarily lithium hydroxide, but may have contained up to 25 percent lithium carbonate. The exposure was to $570\text{-}1500 \text{ mg}/\text{m}^3$ for four hours. The rats developed breathing difficulties and became less energetic.

In addition, they showed symptoms of severe irritation (coughing, choking, bleeding around the eyes and nose) and lost weight. Some rats died, especially at high concentration levels. Examination of the rats revealed lesions in the airways and lungs.

SECTION 11 TOXICOLOGICAL INFORMATION (Continued)

LITHIUM ARSENITE: There is no available toxicological information for this component. The following information is available for inorganic arsenic compounds. Acute exposure: Inorganic arsenic compounds may be irritating, especially with prolonged contact. Some absorption may occur, mainly through damaged skin or when applied in a lipid vehicle. Some Arsenic compounds are sensitizers and sensitization dermatitis may occur in previously exposed persons. Chronic exposure: Exposure to airborne inorganic arsenic compounds may cause burning and itching with two types of dermatitis due to local irritation or sensitization. An Eczematous type with erythema, swelling and papule or vesicles and a follicular type with erythema and follicular swelling or pustules. Chronic dermal lesions may follow this type of initial reaction, but usually only after many years of exposure. hyperkeratosis, warts and melanosis of the skin are conspicuous signs. These chronic skin lesions, particularly the hyperkeratosis may develop into precancerous and cancerous lesions.

SUSPECTED CANCER AGENT: Lithium Hydroxide is not found on the following lists: NTP, IARC, Federal OSHA Z List and Cal-OSHA and therefore is not considered to be, nor suspected to be, cancer-causing agent by these agencies.

Lithium Arsenite (as an Arsenic Compound) is found on the following lists: EPA-A (Human Carcinogen); IARC-Group 1 (Carcinogenic to Humans); NTP-Group 1 (Known to be Carcinogenic); MAK-A1 (Capable of Inducing Malignant Tumors); NIOSH-X (Carcinogen); OSHA-X-(Carcinogen).

IRRITANCY OF PRODUCT: This product is expected to cause severe irritancy and corrosive damage to the skin, eyes, and any other contaminated tissue.

SENSITIZATION TO THE PRODUCT: Allergic reactions to Arsenic compounds, such as Lithium Arsenite, a component of this product, are widely reported.

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 has been reported for Lithium Arsenite, a component of this product.

Embryotoxicity: No component of this product is reported to produce embryotoxic effects in humans.

Teratogenicity: Lithium Arsenite, a component of this product, is known to cause teratogenic effects in humans.

Reproductive Toxicity: No component of this products is expected 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. 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.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory, skin, central nervous system, liver and kidney conditions can be aggravated by over-exposure to this product.

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

BIOLOGICAL EXPOSURE INDICES (BEIs): Biological Exposure Indices (BEIs) associated with the components of this product are as follows:

Chemical Determinant: **ARSENIC AND SOLUBLE COMPOUNDS INCLUDING ARSINE**, Inorganic arsenic metabolites in urine **SAMPLING TIME:**

• End of work week

BEI:

• 50 µg/g creatine

SECTION 12 ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This product is stable in the environment.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Due to the corrosivity of this solution, this product can be harmful or fatal to contaminated plants and animals. As with all chemicals, work practices should be aimed at eliminating environmental releases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Due to the corrosivity of this solution, this product can be harmful or fatal to aquatic plants and animals in contaminated bodies of water.

ACUTE AQUATIC TOXICITY: No data available.

DEGRADABILITY: No data available.

LOG BIOCONCENTRATION FACTOR (BCF): No data available.

LOG OCTANOL/WATER PARTITION COEFFICIENT: No data available.

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SECTION 13 DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: 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 solid waste regulatory authority.

EPA WASTE NUMBER: It is recommended that Toxicity Characteristic Leaching Procedure testing be performed on each batch, as needed. The RCRA Characteristic Code is as follows: D004 (Arsenic), applicable to wastes consisting only of this product.

SECTION 14 TRANSPORT INFORMATION

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

PROPER SHIPPING NAME: Corrosive liquids, toxic, n.o.s. (Lithium Hydroxide, Lithium Arsenite)

HAZARD CLASS NUMBER and DESCRIPTION: 8 (Corrosive)

UN IDENTIFICATION NUMBER: UN 2922

PACKING GROUP: II

DOT LABEL(S) REQUIRED: Corrosive (Primary Hazard).
Toxic (Subsidiary Hazard)

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 154

MARINE POLLUTANT: No component of this product is designated as a DOT Marine Pollutant (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

EMERGENCY RESPONSE CONTACT FOR AN INCIDENT DURING TRANSPORTATION:

CHEMTREC 1-800-424-9300 or 1-703-527-3887

SECTION 15 REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows:

- CERCLA SECTION 103 (40 CFR 302.4): NO
- SARA SECTION 302 (40 CFR 355.30): NO
- SARA SECTION 304 (40 CFR 355.40): Arsenic
- SARA SECTION 313 (40 CFR 372.65): Yes, as Arsenic compounds.

SARA Threshold Planning Quantity: Not applicable.

TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Arsenic = 1 lb.

OTHER FEDERAL REGULATIONS: OSHA Inorganic Arsenic Standard (29 CFR 1910.1018)

STATE REGULATORY INFORMATION: The components of this product are covered under specific State regulations, as denoted below:

- | | |
|---|--|
| Alaska - Designated Toxic and Hazardous Substances: None | New Jersey - Right to Know Hazardous Substance List: Lithium Hydroxide, monohydrate. |
| California - Permissible Exposure Limits for Chemical Contaminants: None. | North Dakota - List of Hazardous Chemicals, Reportable Quantities: None. |
| Florida - Substance List: None | Pennsylvania - Hazardous Substance List: None |
| Illinois - Toxic Substance List: None. | Rhode Island - Hazardous Substance List: None. |
| Kansas - Section 302/313 List: None | Texas - Hazardous Substance List: None |
| Massachusetts - Substance List: None. | West Virginia - Hazardous Substance List: None. |
| Minnesota - List of Hazardous Substances: None | Wisconsin - Toxic and Hazardous Substances: None. |
| Missouri - Employer Information/Toxic Substance List: None | |

CALIFORNIA PROPOSITION 65: Lithium Arsenite (as an Inorganic Arsenic Compound) is on the California Proposition 65 lists as a compound known to the State of California to cause cancer.

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SECTION 15 REGULATORY INFORMATION (Continued)

LABELING (Precautionary Statements): DANGER!, CAUSES SEVERE SKIN AND EYE BURNS. CONTAINS MATERIAL WHICH CAN CAUSE CANCER. MAY BE FATAL IF SWALLOWED. CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS AND KIDNEY DAMAGE. Risk of cancer depends on duration and level of exposure. Do not get on skin or in eyes. Avoid breathing vapor or mists. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, and appropriate body protection. **FIRST-AID:** In case of skin or eye contact, flush skin with water for 15 minutes. Remove contaminated clothing and shoes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. if ingested, do not induce vomiting. Seek medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spilled product with inert material (i.e. polypads). Neutralize residue with caustic neutralizer. Place in a suitable container. Consult Material Safety Data Sheet before use.

WARNING! This product contains a chemical known to the State of California to cause cancer.

TARGET ORGANS: Eyes, skin, mucous membranes (via inhalation or ingestion: central nervous system, kidneys).

WHMIS SYMBOLS: Corrosive (Class E), D2B Other Toxic Effects.

SECTION 16 OTHER INFORMATION

REVISION - Corporation name change, Section 14

The information in this Material Safety Data Sheet is based on data that Chemetall Foote Corporation believes to be reliable as of the MSDS's date of revision. Chemetall Foote Corporation makes no warranty or representation of any kind that the MSDS does not contain errors. The data in this MSDS relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside the control of Chemetall Foote Corporation, there are no warranties, expressed or implied, and Chemetall Foote Corporation assumes no liability in connection with the use of this information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe on any patents. Any use of these data and information must be determined by the user to be in accordance with Federal, State and local laws and regulations.

PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.
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619/565-0302

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**. Skin adsorption 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** 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.

FLAMMABILITY LIMITS IN AIR: Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). **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: 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: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. 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 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 death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

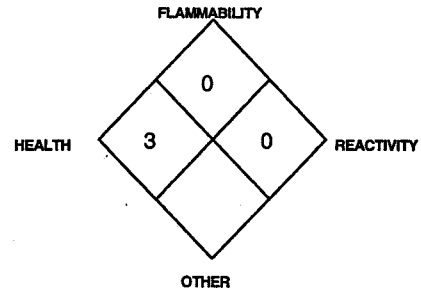
REGULATORY INFORMATION: This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **CTC** are the U.S. Department of Transportation and the Canadian Transportation Commission, respectively. These are: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the materials package label.

SECTION 16 OTHER INFORMATION (Continued)

GRAPHICAL REPRESENTATION OF HAZARDS

HAZARDOUS MATERIAL INFORMATION SYSTEM RATING NATIONAL FIRE PROTECTION SYSTEM RATING

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	3
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			D
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		
For routine industrial applications			



WHMIS SYMBOLS

