MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards .This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard (29 CFR 1910.1200). Other government regulations must be reviewed for applicability to these products.

WARNING: PRODUCT COMPONENTS PRESENT HEALTH AND SAFETY HAZARDS. READ AND UNDERSTAND THIS MATERIAL SAFETY DATA SHEET (M.S.DS.). ALSO, FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES. The information contained herein relates only to the specific product. If the product is combined with other materials, all component properties must be considered. **BE SURE TO CONSULT THE LATEST VERSION OF THE MSDS. MATERIAL SAFETY DATA SHEETS ARE AVAILABLE FROM AUFHAUSER CORPORATION.**

STATEMENT OF LIABILITY-DISCLAIMER

To the best of the Aufhauser Corporation's knowledge, the information and recommendations contained in this publication are reliable and accurate as of the date prepared. However, accuracy, suitability, or completeness are not guaranteed, and no warranty, guarantee, or representation, expressed or implied, is made by Aufhauser Corporation, Inc. as to the absolute correctness or sufficiency of any representation contained in this and other publications; Aufhauser Corporation, Inc. assumes no responsibility in connection therewith; nor can it be assumed that all acceptable safety measures are contained in this and other publications, or that other or additional measures may not be required under particular or exceptional conditions or circumstances . Data may be changed from time to time.

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **PHOSPHOR BRONZE-C ELECTRODES**
CHEMICAL NAME/CLASS: Coated Copper Base Alloy
PRODUCT USE: Metal Welding
SUPPLIER/MANUFACTURER'S NAME: **Aufhauser Corporation**
ADDRESS: 39 West Mall, Plainview, NY 11803
EMERGENCY PHONE: (516) 694-8696
BUSINESS PHONE: 1-800-645-9486
DATE OF PREPARATION: March 17, 2011

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% W/W	EXPOSURE LIMITS IN AIR					
			ACGIH – TLV		OHSA – PEL			
			TWA **MG/**M^3	STEL **MG/**M^3	TWA **MG/**M^3	STEL **MG/**M^3	IDLH **MG/**M^3	OTHER **MG/**M^3
COMPONENT 1: METAL ELECTRODES								
COPPER (EXPOSURE LIMITS ARE FOR COPPER FUME, AS CU)	7440-50-8	56-62	0.2 (FUMES) 1 (DUSTS & MISTS)	NE	0.1 (FUME) 1 (DUSTS & MISTS)	NE	100	NIOSH REL: TWA = 0.1 DFG MAK: TWA = 0.1 (INHALABLE FRACTION) PEAK = 2•MAK 30 MIN., AVG VALUE CARCINOGEN: EPA-D
IRON (EXPOSURE LIMITS ARE FOR IRON OXIDE DUST AND FUME [FE2O3], AS FE)	7439-89-6	1.0	5, A4 (NOT CLASSIFIABLE AS A HUMAN CARCINOGEN)	NE	10	NE	2500	NIOSH REL: TWA = 5 DFG MAK: TWA = 6 (RESPIRABLE FRACTION) CARCINOGEN: IARC-3, TLV-A4

NE = Not Established. See Section 16 for Definitions of Terms Used.
NOTE (1): The ACGIH has an established exposure limit for Welding Fumes, Not Otherwise Classified. The Threshold Limit Value is 5 mg/m3. NIOSH classifies welding fumes as carcinogens. Single values shown are maximum, unless otherwise noted.
NOTE (2): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS (continued)

CHEMICAL NAME	CAS #	% W/W	EXPOSURE LIMITS IN AIR					
			ACGIH – TLV		OHSA – PEL			
			TWA MG/M^3	STEL MG/M^3	TWA MG/M^3	STEL MG/M^3	IDLH MG/M^3	OTHER MG/M^3
COMPONENT 2: FLUX COATING ON ELECTRODES								
PHOSPHORUS (YELLOW)	7723-14-0	0.50	0.1	NE	0.1	NE	5	NIOSH REL: TWA = 0.1 DFG MAKS: TWA = 0.1 PEAK = 2•MAK 5 MIN., MOMENTARY VALUE DFG MAK PREGNANCY RISK CLASSIFICATION: D CARCINOGEN: EPA-D
TIN	7440-31-5	10	2	NE	2	NE	100	NIOSH REL: 2
ALUMINUM OXIDE	1344-28-1	30-40	10 A4 (NOT CLASSIFIABLE AS A HUMAN CARCINOGEN)	NE	15 (TOTAL DUST) 5 (RESPIRABLE DUST)	NE	NE	DFG MAK: TWA = 6 (FUME(
DIATOMACEOUS EARTH	61790-53-2	5-15	10 (INHALABLE PARTICULATE) 3 (RESPIRABLE PARTICULATE)	NE	20 MPPCF OR 80 MG/M^3 / % SiO_2 6 (VACATED 1989 PEL)		3000	NIOSH REL: TWA = 6 DFG MAK: TWA = 4 (INHALABLE FRACTION) DFG MAK PREGNANCY RISK CLASSIFICATION: C CARCINOGEN: IARC-3
FLUORIDE COMPOUND (EXPOSURE LIMITS ARE FOR FLUORIDES AS FLUORINE)		25-35	2.5, A4 (NOT CLASSIFIABLE AS A HUMAN CARCINOGEN)	NE	2.5	NE	NE	DFG MAK: TWA = 2.5 (INHALABLE FRACTION) PEAK = 5•MAK 30 MIN., AVG VALUE CARCINOGEN: IARC-3, TLV-A4
MANGANESE TETRAOXIDE (EXPOSURE LIMITS ARE FOR MANGANESE, ELEMENTAL, INORGANIC COMPOUNDS AS MANGANESE)	1317-35-7	1-5	0.2	NE	NE	5 (CEILING)	500	NIOSH REL: TWA = 1 STEL = 3 DFG MAK: TWA = 0.5 (TOTAL RESPIRABLE DUST FRACTION) DFG MAK PREGNANCY RISK CLASSIFICATION: C CARCINOGEN: EPA-D
POTASSIUM COMPOUND SODIUM COMPOUND		20-30	NE	NE	NE	NE	NE	NE

NE = Not Established. See Section 16 for Definitions of Terms Used.
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NOTE (2): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product consists of bare or coated odorless, solid bronze rods. There are no immediate health hazards associated with this product. This product is neither flammable nor reactive. If involved in a fire, this product may generate irritating fumes and a variety of metal oxides. Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

HMIS CLASSIFICATION

Health: 2 (Blue) Flammability: 0 (Red) Reactivity: 0 (Yellow) Protective Equipment: X (use respiratory apparatus and body protection see section 8)

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: During welding operations, the most significant route of over-exposure is via inhalation of fumes.

3. HAZARD IDENTIFICATION (continued)

INHALATION: Inhalation is not anticipated to be a significant route of over-exposure to the coated electrodes. Repeated overexposures, via inhalation, to the dusts or fumes generated by this product during welding operations may have adverse effects on the lungs with possible asthma and pneumonitis (life-threatening respiratory conditions). Refer to Section 10 (Stability and Reactivity) for information on the specific composition of welding fumes and gases.
CONTACT WITH SKIN or EYES: Contact of this product with the skin is not anticipated to be irritating. Contact with this product can be physically damaging to the eye (i.e., foreign object). Fumes generated during welding operations can be irritating to the skin and eyes. Symptoms of skin over-exposure may include irritation and redness; prolonged or repeated skin over-exposures may lead to allergic contact dermatitis. Symptoms of eye over-exposure may include irritation, redness, and conjunctivitis. Contact with hot electrodes will burn contaminated skin or eyes. Rare cases of allergic contact dermatitis have been reported in people working with copper dust.
SKIN ABSORPTION: Skin absorption is not known to be a significant route of over-exposure for any component of this product.
INGESTION: Ingestion is not anticipated to be a route of occupational exposure for this product.
INJECTION: Though not a likely route of occupational exposure for this product, injection (via punctures or lacerations in the skin) may
HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Symptoms associated with overexposure to this product and the fumes generated during welding operations are as follows:
ACUTE: The chief acute health hazard associated with this product would be the potential for irritation of contaminated skin and eyes when exposed to fumes during welding operations. Contact with the hot electrode will burn contaminated skin or eyes.
CHRONIC: Chronic skin over-exposure to the fumes generated during welding operations may produce dermatitis (red, inflamed skin). Repeated over-exposures, via inhalation, to the dusts or fumes generated by this product during welding operations may have adverse effects on the lungs with possible asthma and pneumonitis (life-threatening respiratory conditions).
TARGET ORGANS: For fumes: ACUTE: Skin, eyes, respiratory system. For fumes: CHRONIC: Skin, respiratory system.

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

4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.
SKIN EXPOSURE: If fumes generated by welding operations involving this product contaminate the skin, begin decontamination with running water. If molten material contaminates the skin, immediately begin decontamination with cold, running water. Minimum flushing is for 15 minutes. Victim must seek medical attention if any adverse reaction occurs.
EYE EXPOSURE: If fumes generated by welding operations involving this product enter 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 15 minutes. Victim must seek immediate medical attention.
INHALATION: If fumes generated by welding operations involving this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.
INGESTION: Ingestion is not a likely route of exposure for this product. If swallowed call physician immediately! Do not induce vomiting unless directed by medical personnel. Rinse mouth with water if person is conscious. Never give fluids or induce vomiting if person is unconscious, having convulsions, or not breathing.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Dermatitis, other skin conditions, asthma, and other respiratory disorders may be aggravated by prolonged over-exposures to the dusts or fumes generated by these products.
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

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: YES Carbon Dioxide: YES
Halon: YES Foam: YES Dry Chemical: YES Other: Any "ABC" Class
UNUSUAL FIRE AND EXPLOSION HAZARDS In the heat of a fire, the product may produce fumes containing copper, manganese, silicon, phosphorous compounds and other metal oxides.
Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.
SPECIAL FIRE-FIGHTING PROCEDURES: Not applicable.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Not Applicable.

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

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Do not eat or drink while handling these products. Use ventilation and other engineering controls to minimize potential exposure to these products.
STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Use in a properly ventilated location. Avoid breathing fumes of these products during welding or brazing operations. When these products are used during welding or brazing operations, follow the requirements of the Federal Occupational Safety and Health Welding and Cutting Standard (29 CFR 1910 Subpart Q) and the safety standards of the American National Standards Institute for welding and cutting (ANSI Z49.1). Store packages in a cool, dry location. Storage in an atmosphere that is wet, moist, or highly humid may lead to corrosion of these products. Store away from incompatible materials (see Section 10, Stability and Reactivity).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Prudent practice is to ensure eyewash/safety shower stations are available near areas where these products are used.
RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below guidelines listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed (i.e. a Weld Fume Respirator, or Air-Line Respirator for welding in confined spaces), U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Respiratory Protection is recommended to be worn during welding operations. Oxygen levels below 19.5% are considered IDLH byOSHA. 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: Safety glasses. When these products are used in conjunction with welding or brazing, wear safety glasses, goggles, or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting").
HAND PROTECTION: Wear welding gloves for routine industrial use. When these products are used in conjunction with welding or brazing, wear gloves that protect from sparks and flame (per ANSI Z49.1-1988, "Safety in Welding and Cutting").
BODY PROTECTION: Wear body protection appropriate for task.

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): N/A
EVAPORATION RATE (nBuAc = 1): N/A
SPECIFIC GRAVITY @ 20°C (water = 1): Not established
FREEZING/MELTING POINT: Not established
SOLUBILITY IN WATER: Insoluble
pH: Not Applicable
VAPOR PRESSURE, mm Hg @ 1284°C: N/A
BOILING POINT @ 24 mm Hg: NOT ESTABLISHED
ODOR THRESHOLD: Not Applicable
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not Applicable
APPEARANCE AND COLOR: This product consists of odorless, coated rods and electrodes.
HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance is a distinctive characteristic of this product.

10. STABILITY and REACTIVITY

STABILITY: Stable.
DECOMPOSITION PRODUCTS: Metal fumes, a variety of metal compounds, carbon dioxide, carbon monoxide, metal oxides.
NOTE: The composition and quality of welding fumes and gases are dependent upon the metal being welded, the process, the procedure, and the electrodes used. Other conditions that could also influence the composition and quantity of fumes and gases to which workers may be exposed include the following: any coatings on metal being welded (e.g., paint, plating, or galvanizing), the number of welders and the volume of the work area, the quality of ventilation, the position of the welder's head with respect to the fume plume, and the presence of other contaminates in the atmosphere. When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2 (Composition and Information on Ingredients). Fume and gas decomposition products, and not the ingredients in the electrode, are important.

Concentration of the given fume or gas component may decrease or increase by many times the original concentration. New compounds in the electrode may form. Decomposition products of normal operations include not only those originating from volatilization, reaction, or oxidation of the product's components but also those from base metals and any coating (as noted previously). The best method to determine the actual composition of generated fumes and gases is to take an air sample from inside the welder's helmet if worn or in breathing zone. For additional information, refer to the American Welding Society Publication, "Fumes and Gases in the Welding Environment".
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, strong oxidizers, sulfur.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Avoid uncontrolled exposure to extreme temperatures and incompatible materials.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Presented below are human toxicological data available for the components of these products present in concentration greater than 1%. Other data for animals are available for the components of these products, but are not presented in this Material Safety Data Sheet.
SUSPECTED CANCER AGENT: The components of this product are listed as follows:

COPPER: EPA-D (Not Classifiable as to Human Carcinogenicity)
PHOSPHORUS: EPA-D (Not Classifiable as to Human Carcinogenicity)
DIATOMACEOUS EARTH: IARC-3 (Not Classifiable as to carcinogenicity to Humans)
MANGANESE TETRAOXIDE: EPA-D (Not Classifiable as to Human Carcinogenicity-(inadequate human and animal evidence of carcinogenicity or no data available).

The other components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are not considered to be, nor suspected to be, cancer-causing agents by these agencies.
IRRITANCY OF PRODUCT: Dusts or fumes of this product may be irritating to contaminated skin and eyes. Fumes may be irritating to the respiratory system.
SENSITIZATION TO THE PRODUCT: Rare cases of allergic contact dermatitis have been reported in people working with copper dust.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of these products and their constituents on the human reproductive system.

11. TOXICOLOGICAL INFORMATION (continued)

Mutagenicity: These components are not reported to produce mutagenic effects in humans.
Embryotoxicity: These components are not reported to produce embryotoxic effects in humans.
Teratogenicity: These components are not reported to cause teratogenic effects in humans.
Reproductive Toxicity: These components are not reported to cause reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of the Manganese Tetraoxide component of this product indicate adverse reproductive effects.

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.

BIOLOGICAL EXPOSURE INDICES: Currently, there are Biological Exposure Indices (BEIs) associated with the proprietary Fluoride Compound component of this product.

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
•Fluorides in Urine	• Prior to Shift • End of Shift	•3 mg/g creatinine • 10 mg/g creatinine

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: The metal components of this product occur naturally in the environment and are expected to persist in the environment for an extended period of time.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product is not expected to cause adverse effects on plant or animal life. Specific data on test animals are available but are not presented in this Material Safety Data Sheet.
EFFECT OF CHEMICAL ON AQUATIC LIFE: This product is not expected to cause adverse effects on aquatic life. Low chronic aquatic limits indicate a high chronic hazard, it may be concentrated to toxic levels in food chain. The following aquatic toxicity data are available for the components:

COPPER:
LC_{50} (fathead minnows) = 0.14 ppm in hard water
LC_{50} (bluegill) = 0.02 ppm in soft water
LC_{50} (brook trout) = 0.09 ppm in soft water

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 hazardous waste regulatory authority.
EPA WASTE NUMBER: Not applicable.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS NOT HAZARDOUS (Per 49 CFR 172.101) BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Not Applicable
HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable
UN IDENTIFICATION NUMBER: Not Applicable
PACKING GROUP: Not Applicable
DOT LABEL(S) REQUIRED: Not Applicable
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER, 2000: Not Applicable
MARINE POLLUTANT: The Department of Transportation (49 CFR 172.101, Appendix B), lists Copper, metal powder as a Marine Pollutant. This component is not present in the specific form listed and therefore, this product does not meet the marking requirement of 49 CFR 172.322.
TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This material is not considered as dangerous goods, per regulations of Transport Canada.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:
U.S. SARA REPORTING REQUIREMENTS: The components of these products are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Manganese Tetraoxide (Manganese Compound Category	No	Yes	Yes
Aluminum Oxide (fibrous forms)	No	No	Yes
Phosphorus	Yes	Yes	Yes (yellow or white)

U.S. SARA THRESHOLD PLANNING QUANTITY:: Phosphorous = 100 lbs.
U.S. TSCA INVENTORY STATUS: The components of these products are listed on the TSCA Inventory.
U.S. CERCLA REPORTABLE QUANTITY (RQ): Copper = 5000 lbs (2270 kg); Manganese Tetraoxide = 1 lb (0.45 kg). Phosphorous = 1 lb
OTHER U.S. FEDERAL REGULATIONS: If these products are used during welding operations, follow the requirements of the Federal Occupational Safety and Health Welding and Cutting Standard (29 CFR 1910 Subpart Q).

15. REGULATORY INFORMATION (continued)

U.S. STATE REGULATORY INFORMATION: The components of this products are covered under specific State regulations, as denoted below:

Alaska-Designated Toxic and Hazardous Substances: Aluminum Oxide, Copper, fume, dust and mist, Phosphorous (yellow), Manganese Tetraoxide, Tin.
California-Permissible Exposure Limits for Chemical Contaminants: Aluminum Oxide, Copper, Phosphorous (yellow), Manganese Tetraoxide, Tin.
Florida-Substance List: Copper fume, dust and mist, Manganese Tetraoxide, Phosphorous (yellow), Tin.
Illinois-Toxic Substance List: Aluminum Oxide, Phosphorous (yellow), Diatomaceous Earth.
Kansas-Section 302/313 List: Aluminum Oxide, Copper and compounds, Manganese and compounds, as Mn.
Massachusetts-Substance List: Manganese Tetraoxide, Phosphorous (yellow), Tin.
Michigan-Critical Materials Register: Copper
Minnesota-List of Hazardous Substances: Aluminum Oxide, Diatomaceous Earth, Manganese Tetraoxide, Phosphorous (yellow), Tin.
Missouri-Employer Information/Toxic Substance List: Aluminum Oxide, Phosphorous (yellow), Copper; Tin.
New Jersey-Right to Know Hazardous Substance List: Aluminum Oxide, Copper, Diatomaceous Earth, Tin.
North Dakota-List of Hazardous Chemicals, Reportable Quantities: Phosphorous (yellow), Copper.
Pennsylvania-Hazardous Substance List: Aluminum Oxide, Phosphorous (yellow), Copper, Manganese Tetraoxide, Tin.
Rhode Island-Hazardous Substance List: Aluminum Oxide, Copper, fume, dust, mist; inorganic dust and fumes, Manganese Tetraoxide, Phosphorous (yellow), Tin.
Texas-Hazardous Substance List: Copper, fume, Manganese, Phosphorous (yellow), Tin.
West Virginia-Hazardous Substance List: Copper, fume, Phosphorous (yellow), Tin.
Wisconsin-Toxic and Hazardous Substances: Copper, fume, Phosphorous (yellow), Tin.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is listed on the California Proposition 65 Lists. **WARNING: This product may contain chemicals, and when used for welding may produce fumes or gases containing chemicals, known to the State of California to cause cancer, and/or birth defects (or other reproductive harm.)**

LABELING (Precautionary Statements):

WARNING: PROTECT yourself and others. Read and understand this information.
FUMES AND GASES can be hazardous to your health.
ARC RAYS can injure your eyes and burn skin.
ELECTRIC SHOCK can kill.

- Before Use, read and understand the manufacturer's instructions. Material Safety Data Sheets (MSDSs), and your employer's safety policies.
- Keep your head out of the fumes.
- Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases from your breathing zone and the general area.
- Wear correct eye, ear, and body protection.
- See American National Standard Z49.1 *Safety in Welding, Cutting, and Allied Processes*, published by the American Welding Society, 550 N.W. LeJeune Road, Miami, Florida 33126. OSHA Safety and Health Standards, available from the U.S. Government Printing Office, Washington, DC 20402

DO NOT REMOVE THIS INFORMATION.
ADDITIONAL CANADIAN REGULATIONS:
CANADIAN DSL/NDSL INVENTORY STATUS: The components of these products are on the DSL Inventory.
OTHER CANADIAN REGULATIONS: Not applicable.
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Fluoride compounds (as Inorganic Fluoride) is classified as Toxic on the CEPA First Priorities Substance Lists.
CANADIAN WHMIS SYMBOLS: Not applicable.

16. OTHER INFORMATION

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DATE OF PRINTING: March 17, 2009

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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.

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 (**REL**s). 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_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - 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^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. 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 lifeforms which consume contaminated plant or animal matter. Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** 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/NDSL** are the Canadian Domestic/Non-Domestic Substances Lists. **The CPR is the Canadian Product Regulations.** This section also includes information on the precautionary warnings which appear on the materials package label.