MSDS

(Posted 9/06/2012)

The attached MSDS sheets supersede all other MSDS sheets. Please file accordingly.

VENDOR: **JW HARRIS A562-44**

STOCK#	MFG# DESCRIPTION
R53-673	66000 DYNAFLOW
R53-674	1-STICK R53-673
R54-560	21035 STAY-SILV O
R54-563	1 STICK R54-560

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.

STATEMENT OF LIABILITY-DISCLAIMER

To the best of the Harris Products Group 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 Harris Products Group as to the absolute correctness or sufficiency of any representation contained in this and other publications; Harris Products Group. 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): PHOS/COPPER BRAZING ALLOYS:

DYNAFLOW®
SUPER DYNAFLOW®
HARRIS 0
HARRIS 0AM
HARRIS 0LP
HARRIS 0HP (LCuP 7)
HARRIS 0HHP
HARRIS 0XHP
LAg2PA
LAg5PA
LCuP 6
MB-15
LCuP 8
LCuPSn-7
PHOSON +®
PSN 4
QUICKSILVER®
STAY-SILV® 2
STAY-SILV® 2.5
STAY-SILV® 2HP
STAY-SILV® 2LP (LAg2PB)
STAY-SILV® 5
FLASH®
SILV 1T
STAY-SILV® 5HP (LAg5PB)
STAY-SILV® 5LP
STAY-SILV® 6
STAY-SILV® 6.5
STAY-SILV® 6HP
STAY-SILV® 6LP
STAY-SILV® 15
STAY-SILV® 15HP
STAY-SILV® 15LP
STAY-SILV® 18LP (18M)
BLOCKADE ® Bare & Flux-Coated
STAY-SILV® 18

CHEMICAL NAME/CLASS:	Metal Brazing Alloy
SYNONYMS:	Not Applicable
PRODUCT USE:	Metal Brazing
DOCUMENT NUMBER:	0082
SUPPLIER/MANUFACTURER'S NAME:	**HARRIS Products Group**
ADDRESS:	4501 Quality Place, Mason, Ohio 45040
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	513-754-2000 FAX 513-754-8778
DATE OF PREPARATION:	July 8, 2010
PRINT DATE:	September 13, 2005

2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS

PRODUCT NAME	Ag	Cu	Sn	Si	P
DYNAFLOW®	6.0	Balance			6.1
SUPER DYNAFLOW®	18.0	Balance			7.3
HARRIS 0		Balance			7.1
HARRIS 0AM		Balance			6.95
HARRIS 0LP		Balance			6.8

HARRIS OHP (LCuP 7)		Balance			7.4
HARRIS OHHP		Balance			7.6
HARRIS OXHP		Balance			7.8

2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

PRODUCT NAME	Ag	Cu	Sn	Si	P
LAg2PA	1.7	Balance			6.4
LAg5PA	4.6	Balance			6.3
LCuP 6		Balance			6.5
LCuP 8		Balance			8.1
LCuPSn-7		Balance	7.0		6.8
PHOSON +®	15.0	Balance			7.3
PSN 4		Balance	4.0		6.0
QUICKSILVER®		Balance			7.2
STAY-SILV® 2	2.0	Balance			7.0
STAY-SILV® 2.5	2.4	Balance			6.4
STAY-SILV® 2HP	2.0	Balance			7.4
STAY-SILV® 2LP (LAgPB)	2.0	Balance			6.5
STAY-SILV® 5	5.0	Balance			6.0
STAY-SILV® 5HP (LAg5PB)	5.0	Balance			6.5
STAY-SILV® 5LP	5.0	Balance			5.7
STAY-SILV® 6	6.0	Balance			6.5
STAY-SILV® 6.5	6.4	Balance			6.1
STAY-SILV® 6HP	6.0	Balance			7.2
STAY-SILV® 6LP	6.0	Balance			6.2
STAY-SILV® 15	15.0	Balance			5.0
STAY-SILV® 15HP	15.0	Balance			5.4
STAY-SILV® 15LP	15.0	Balance			4.7
MB-15	15.0	Balance			5.0
STAY-SILV® 18LP (18M)	18.0	Balance			5.8
STAY-SILV 1T	1.0-1.2	Balance	0.04-0.06		6.0-6.2
FLASH®		Balance			8.2
MB-15	15.0	Balance			5.0
BLOCKADE®		Balance	<10.0	<4.0	<8.0

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR					
		ACGIH-TLV		OSHA-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
Phosphorous (yellow)	7723-14-0	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 Pregnancy Risk Classification: D Carcinogen: EPA-D
Tin The following exposure limits are for "Tin, Metal"	7440-31-5	2	NE	2	NE	100	NIOSH REL: TWA = 2
Silicon	7440-21-3	10	NE	15 (Total dust) 5 (Respirable fraction) 10 (Total dust) (vacated 1989 PEL)	NE	NE	NIOSH REL: TWA = 10 (Total dust); 5 (Respirable fraction)
Silver, Metal	7440-22-4	0.1	NE	0.01	NE	10	NIOSH REL: TWA = 0.01 DFG MAK: TWA = 0.01 (Inhalable Fraction) PEAK = 10•MAK 30 min., average value Carcinogen: EPA-D

Copper (exposure limits are for "Copper fume, as Cu")	7440-50-8	0.2 (fume) 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., average value Carcinogen: EPA-D

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

NOTE (1): The ACGIH has an established exposure limit for Brazing Fumes, Not Otherwise Classified. The Threshold Limit Value is 5 mg/m^3. NIOSH classifies Brazing 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)

Flux coated BLOCKADE consist of metal wire or rods, with a thin coating of flux on them. The exact amount of coating on each rod may vary. It can be reasonably estimated that there is less than 1% of each of the flux constituents present on any given rod when compared to the mass of the rod itself. The composition values given for the flux coating are the composition of the flux when the rods are flux-coated.

COMPONENT 2: FLUX COATING ON BLOCKADE FLUX COATED RODS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL			OTHER
			TLV mg/m^3	STEL mg/m^3	PEL mg/m^3	STEL mg/m^3	IDLH mg/m^3	mg/m^3
Boric Acid	10043-35-3	10–35	NE	NE	NE	NE	NE	NE
Proprietary Fluoride Compound (exposure limits are for inorganic, solid Fluoride compounds, as F; 7789-75-5)	Proprietary	30-50	2.5, A4 (Not Classifiable as a human carcinogen)	NE	2.5	NE	NE	DFG MAKs:TWA = 2.5 (Inhalable Fraction) PEAK = 5•MAK 30 min., average value Carcinogen: IARC-3, TLV-A4
Methacrylate/Aliphatic & Naphthenic Hydrocarbon Compound	Proprietary		NE	NE	NE	NE	NE	NE
Water	7732-18-5	Balance	NE	NE	NE	NE	NE	NE

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: These products consist of odorless, metallic, copper-colored wires and rods in a variety of diameters which may have a flux coating. There is no immediate health hazard associated with the wire products. These products are not reactive under normal circumstances of use. Though the products are not flammable, when heated they will produce fumes containing a variety of copper and silver compounds. Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: During brazing operations, the most significant route of overexposure is via inhalation of fumes.

INHALATION Exposure to fumes of these products will irritate the nose, throat and other tissues of the respiratory system. Overexposure to Copper fumes may produce metal fume fever. Symptoms of metal fume fever resemble the flu and include sweating, fever, headache, chills, muscle aches, nausea, vomiting, weakness, and tiredness. If dusts or particulates generated by the flux coating on the flux coated products are inhaled, they will irritate the nose, throat, and lungs. Dusts and particulates of the flux coating on the flux coated products may destroy mucous membranes and may cause pneumonitis.

CONTACT WITH SKIN or EYES: Contact with the wire or rod forms of these products is not anticipated to be irritating. Contact with the wire form can be physically damaging to the eye. Fumes generated during brazing or welding operations can irritate the skin and eyes. Symptoms of skin overexposure may include irritation and redness; prolonged or repeated skin overexposures may lead to dermatitis. Contact with the molten material will burn contaminated skin or eyes. Eye contact with dusts or particulates generated by the flux coating on the flux coated products will cause irritation, pain, tearing, and reddening. Brief contact may cause eye damage and prolonged contact may cause permanent damage. Depending on the duration of over-exposure, skin contact with dusts or particulates generated by the flux coating on the flux coated products may cause irritation and burns. Chronic over-exposure to dusts or particulates generated by the flux coating on the flux coated products may cause borism (dry skin, eruptions, and gastrointestinal disturbances) or pustular dermatitis (visible collections of pus).

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		X

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For routine industrial applications

3. HAZARD IDENTIFICATION (Continued)

SKIN ABSORPTION: Skin absorption is not a significant route of overexposure for any component of these bare products. In some situations, one of the decomposition products of the flux coating may be hydrogen fluoride. Hydrogen fluoride can penetrate the skin and produce burns that may not be immediately painful or visible; the burns impact the lower layers of skin and bone tissue. Hydrogen fluoride exposures involving 20 percent of the body or more can be fatal through systemic fluoride poisoning.

INGESTION: Ingestion of the rods is not a likely route of occupational exposure.

INJECTION: Though not a likely route of occupational exposure for these products, injection (via punctures or lacerations in the skin) may cause local reddening, tissue swelling, and discomfort.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Symptoms associated with overexposure to these products and the fumes generated during brazing operations are as follows:

ACUTE: The chief health hazard associated with these products would be the potential for overexposure to fumes during brazing operations. Overexposure to Copper fumes may produce metal fume fever. Contact with the molten material will burn contaminated skin or eyes. Depending on the duration of over-exposure, dusts or particulates generated by the flux coating on the flux coated products may be irritating or damaging to the entire respiratory tract, eyes, and skin. In some situations, one of the flux coating's decomposition products may be hydrogen fluoride. Hydrogen fluoride can penetrate the skin and produce burns that may not be immediately painful or visible; the burns impact the lower layers of skin and bone tissue. If dusts or particulates generated by the flux coating on the flux coated products are swallowed, they may burn the mouth, throat, esophagus, and other tissues of the digestive system.

CHRONIC: Chronic skin overexposure to the fumes of these products during brazing operations may produce dermatitis (red, inflamed skin). Chronic skin over-exposure to dusts or particulates generated by the flux coating on the flux coated products may cause borism (dry skin, eruptions, and gastrointestinal disturbances) or pustular dermatitis (visible collections of pus). Chronic ingestion of the fluoride component of the flux coating may cause osseous fluorosis (increased radiographic density of the bones). Symptoms of chronic ingestion of dusts or particulates generated by the flux coating on the flux coated products may include kidney damage, asthma, and pain in the joints and muscles. Chronic skin contact or ingestion of dusts, salts, or fumes of Silver, (a component of these products) can result in a condition known as Argyria. This condition is marked by a bluish appearance of the skin and eyes. Refer to Section 11 (Toxicological Information) for further information.

TARGET ORGANS: ACUTE: Skin, eyes, and respiratory system. CHRONIC: Skin, respiratory system.

See Section 16 for Definition of Ratings

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 dust or particulates generated by the flux coating on the flux coated products or fumes generated by brazing 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 dust or particulates generated by the flux coating on the flux coated products or fumes generated by brazing 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 dust or particulates generated by the flux coating on the flux coated products or fumes generated by brazing 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 these products. 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: Skin and respiratory disorders, may be aggravated by prolonged overexposures to the fumes of 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:

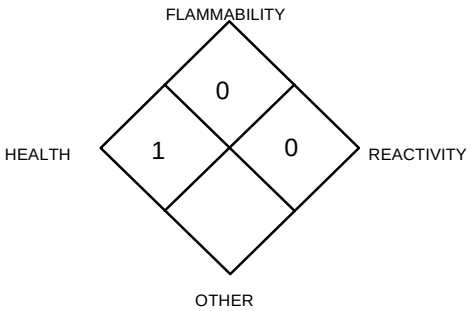
Water Spray: YES	Carbon Dioxide: YES
Halon: YES	Foam: YES
Dry Chemical: YES	Other: Any "ABC" Class

UNUSUAL FIRE AND EXPLOSION HAZARDS When involved in a fire, these products may generate irritating fumes and a variety of metal oxides. If involved in a fire, the flux coating on the flux coated products may decompose to release fluoride compounds, boric anhydride, and hydrogen fluoride. The molten rods can present significant thermal hazards to firefighters.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Not applicable.

NFPA RATING



See Section 16 for Definition of Ratings

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: As with all chemicals, avoid getting these products ON YOU or IN YOU. Wash thoroughly after handling these products. Do not eat or drink while handling these products. Use ventilation and other engineering controls to minimize potential exposure these products.

STORAGE AND HANDLING PRACTICES: All employees who handle these products should be trained to handle them safely. Use in a well-ventilated location. Avoid breathing fumes generated by these products during brazing operations. Packages of these products must be properly labeled. Store containers in a cool, dry location. Store away from incompatible materials (see Section 10, Stability and Reactivity).

When these products are used during brazing operations, it is recommended that 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) be followed.

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 brazing in confined spaces), use only protection authorized in 29 CFR 1910.134 or applicable State regulations. Respiratory Protection is recommended to be worn during brazing operations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). Respiratory protection guidelines for Copper and Silver dusts (as may be generated during metal processing or during brazing) are provided as follows:

NIOSH RECOMMENDATIONS FOR COPPER DUSTS AND MISTS (as Cu) CONCENTRATIONS IN AIR:

Up to 5 mg/m^3: Dust and mist respirator.

Up to 10 mg/m^3: Dust and mist respirator except single-use and quarter-mask respirator (if not present as a fume); or Supplied Air Respirator (SAR).

Up to 25 mg/m^3: Powered air-purifying respirator with dust and mist filter(s); or SAR operated in a continuous-flow mode.

Up to 50 mg/m^3: Full-facepiece respirator with high-efficiency particulate filter(s); or full-facepiece Self-Contained Breathing Apparatus (SCBA); or full-facepiece SAR; or powered air-purifying respirator with tight-fitting facepiece and high-efficiency particulate filter.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

Up to 100 mg/m^3: Positive pressure, full-facepiece SAR.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece respirator with high-efficiency particulate filter(s); or escape-type SCBA.

NIOSH/OSHA RECOMMENDATIONS FOR SILVER (METAL DUST AND SOLUBLE COMPOUNDS, AS SILVER) CONCENTRATIONS IN AIR:

Up to 0.25 mg/m^3: Supplied Air Respirator (SAR) operated in a continuous-flow mode or powered air-purifying respirator with high-efficiency particulate filter.

Up to 0.5 mg/m^3: Full-facepiece respirator with high-efficiency particulate filter(s), full-facepiece Self-Contained Breathing Apparatus (SCBA), or full-facepiece SAR.

Up to 10 mg/m^3: Positive pressure, full-facepiece SAR.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece respirator with high-efficiency particulate filter(s) or escape-type SCBA.

EYE PROTECTION: Safety glasses. When these products are used in conjunction with brazing, it is recommended that safety glasses, goggles, or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting") be worn.

HAND PROTECTION: Wear gloves for routine industrial use. When these products are used in conjunction with brazing, it is recommended that gloves that protect from sparks and flame (per ANSI Z49.1-1988, "Safety in Welding and Cutting") be worn.

BODY PROTECTION: Use body protection appropriate for task.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Copper, the main component of this product:

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

SPECIFIC GRAVITY (water = 1): 8.94

SOLUBILITY IN WATER: Insoluble.

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

ODOR THRESHOLD: Not applicable.

EVAPORATION RATE (nBuAc = 1): Not applicable.

FREEZING/MELTING POINT: 1083°C (1981°F)

pH: Not applicable.

BOILING POINT: 2595°C (4703°F)

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

The following information is for the product:

APPEARANCE AND COLOR: These products consist of metallic-copper wire and rods with no odor, which may have a flux coating.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance is a distinctive characteristic of these products.

10. STABILITY and REACTIVITY

STABILITY: Stable.
DECOMPOSITION PRODUCTS: Thermal decomposition may produce copper, phosphorous, and silver compounds and a variety of metal oxides.
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, oxidizers, halogens, and acid chlorides.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Uncontrolled exposure to extreme temperatures, 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. Other data for animals are available for the components of these products, but are not presented in this Material Safety Data Sheet.

BORIC ACID:
Skin Irritancy (human) = 15 mg/ 3 days/ intermittent; mild
LD (oral, human) = 37 mg/kg/ boron as boric acid
LD (skin, infant) = 210 mg/kg/ boron as boric acid
TDLo (oral, rat) = 45000 mg/kg/ 90 days/ male; reproductive effects
TDLo (oral, child) = 500 mg/kg; gastrointestinal effects
LDLo (oral, man) = 429 mg/kg; cardiovascular, systemic effects
LDLo (oral, woman) = 200 mg/kg
TDLo (oral, infant) = 800 mg/kg/ 4 weeks/ intermittent
LDLo (oral, infant) = 934 mg/kg
LDLo (skin, infant) = 1200 mg/kg
LDLo (skin, child) = 4000 mg/kg/ 4 days
LDLo (skin, man) = 2430 mg/kg
LDLo (skin, child) = 1500 mg/kg
LDLo (subcutaneous, infant) = 1100 mg/kg
TDLo (unreported, man) = 170 mg/kg; gastrointestinal effects
LDLo (unreported, man) = 147 mg/kg

COPPER:
TDLo (oral, human) = 120 μg/kg; gastrointestinal tract effects

SILVER:
TCLo (inhalation, human) = 1 mg/m^3; skin effects

PHOSPHOROUS:
LDLo (unreported, man) = 4412 μg/kg

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: The components of this product are listed as follows:

COPPER: EPA-D (Not Classifiable as to Human Carcinogenicity)
SILVER: EPA-D (Not Classifiable as to Human Carcinogenicity)
PHOSPHORUS: EPA-D (Not Classifiable as to Human Carcinogenicity)
PROPRIETARY FLUORIDE COMPOUND (as a Fluoride Compound): IARC-3 (Unclassifiable as to Carcinogenicity in Humans), ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen)

The other components of these products are not found on the following lists: FEDERAL, OSHA Z LIST, NTP, IARC and CAL/OSHA and therefore are neither 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 components on the human reproductive system.

Mutagenicity: These products are not reported to produce mutagenic effects in humans. Animal mutation data is available for Boric Acid (constituent of flux coated products); this data was obtained during clinical studies on specific animal tissues exposed to high doses of this compound.
Embryotoxicity These products are not reported to produce embryotoxic effects in humans.
Teratogenicity: These products are not reported to cause teratogenic effects in humans. Studies on test animals exposed to relatively high doses of Copper (a component of this product) indicate adverse teratogenic effects.
Reproductive Toxicity: These products are not reported to cause reproductive effects in humans. Studies on test animals exposed to relatively high doses of Boric Acid and Copper (components of some of these products) 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.

Currently, there are Biological Exposure Indices (BEIs) determined for the Fluoride Compound component of the Flux Coating (as a Fluoride).

BIOLOGICAL EXPOSURE INDICES (BEIs) for components of these products are as follows:

CHEMICAL: DETERMINANT	SAMPLING TIME	BEI
FLUORIDES:		
Fluorides in urine	Prior to shift	3 mg/g creatinine
	End of shift	10 mg/g creatinine

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of these products occur naturally in the environment and are expected to persist in the environment for an extended period of time. The components will react with water and air to form a variety of metal oxide compounds. The following environmental data are available for the components of these products.

BORIC ACID: Water solubility = 1 g/ 18 mL (cold), 1 g/ 4 mL (boiling).

SILVER: Solubility: Insoluble. Many silver salts are only slightly soluble and so silver cations will rapidly be reduced to lower levels. The Biological half-life for silver is a few days for animals and up to 50 days for humans.

COPPER: Solubility: Insoluble. There is no evidence of any biotransformation for copper compounds. Copper is accumulated by all plants and animals. BCF Algae = 12; plants = 1,000; invertebrate = 1,000, fish = 667 and fish =200(Soluble copper salts).

PHOSPHOROUS: Solubility in water 1 part/300,000 parts water. Radioactive phosphorous has been concentrated by factors of 75,000 by waterfowl and 850,000 by aquatic life.

TIN: Solubility: Insoluble in water.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Animal studies on copper indicate various health effects after ingestion and exposures. Specific data on test animals are available, but are not presented in this Material Safety Data Sheet.

EFFECT OF CHEMICAL ON AQUATIC LIFE: These products are 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:

BORIC ACID:
LC_{50} (trout eggs) = 100 ppm/ soft
LC_{50} (trout eggs) = 79 ppm/ hard
LC_{50} (catfish eggs) = 155 ppm/ soft
LC_{50} (catfish eggs) = 22 ppm/ hard
LC_{50} (goldfish eggs) = 46 ppm/ soft
LC_{50} (goldfish eggs) = 75 ppm/ hard
LC_{50} (*Daphnia magna*) = 133 mg/L/ 48 hours

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

SILVER: 0.1 ppm is toxic to bacteria and aquatic life. Discharge into marine waters should not exceed /20 of 96 hour LC50, 0.25-0.025 mg/kg/day.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. These products, 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: Waste of these products should be analyzed for Toxicity Characteristic Leaching Procedure chemicals, as follows: D011 (Silver), Regulated Level: 5.0 mg/L.

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: No component of this product is designated as a marine pollutant by the Department of Transportation (49 CFR 172.101, Appendix B).

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)
Copper	No	Yes	Yes
Silver	No	Yes	Yes
Phosphorous	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 lb.; Silver = 1,000 lb.; (for metal particles under 100 micrometers in diameter). Phosphorous = 1 lb.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

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

Alaska-Designated Toxic and Hazardous Substances: Copper, fume, dust and mist, Phosphorous (yellow), Tin.

California-Permissible Exposure Limits for Chemical Contaminants: Copper, Silicon, Silver, Phosphorous (yellow),and Tin.

Florida-Substance List: Copper fume, dust and mist; Silver, Phosphorous (yellow),Tin.

Illinois-Toxic Substance List: Copper, Inorganic Fluoride Compounds, Silicon, Silver, and Phosphorous.

Kansas-Section 302/313 List: Copper and compounds.

Massachusetts-Substance List: Phosphorous (yellow),Tin.

Michigan-Critical Materials Register: Copper.

Minnesota-List of Hazardous Substances: Copper, fume; Silver, Silicon, Phosphorous (yellow),Tin.

Missouri-Employer Information/Toxic Substance List: Copper; Fluoride Compounds, Silicon, Silver, Phosphorous (yellow),Tin.

New Jersey-Right to Know Hazardous Substance List: Copper, Fluoride Compounds, Silver, and Tin.

North Dakota-List of Hazardous Chemicals, Reportable Quantities: Copper, Silver, and Phosphorous.

Pennsylvania-Hazardous Substance List: Copper, Silicon, Silver, Phosphorous, and Tin.

Rhode Island-Hazardous Substance List: Copper, fume, dust, mist; Silicon, Silver, Phosphorous (red, white, yellow) ,Tin.

Texas-Hazardous Substance List: Copper, fume, 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): The components of these products are not on the California Proposition 65 lists.

LABELING (Precautionary Statements): FOR FLUX-COATED RODS: CONTAINS FLUORIDES. CAN BE FATAL IF SWALLOWED

FOR FLUX-COATED RODS AND BARE WIRE:

WARNING: PROTECT yourself and others. Read and understand this information.

FUMES AND GASES can be hazardous to your health.

HEAT RAYS (INFRARED RADIATION) from flame or hot metal can injure your eyes.

- 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.
- Avoid contact of flux with the eyes and skin.
- Do not take internally.
- Use enough ventilation, exhaust at the flame, 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, Superintendent Office, P.O. Box 371954, Pittsburgh, PA 15250-7954.

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: The components of these products are not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS SYMBOLS: Not applicable.

16. OTHER INFORMATION

DATE OF PRINTING: September 13, 2005

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 this product. The information contained herein relates only to the specific product. If the product is combined with other materials, all component properties must be considered. To the best of the Harris Products Group knowledge, the information and recommendations contained in this publication are reliable and accurate as of the date of issue. However, accuracy, suitability, or completeness are not guaranteed, and no warranty, guarantee, or representation, expressed or implied, is made by Harris Products Group. as to the absolute correctness or sufficiency of any representation contained in this and other publications; Harris Products Group. assumes no responsibility in connection therewith; nor can it be assumed that all acceptable safety measures may not be required under particular or exceptional conditions or circumstances. Data may be changed from time to time. Be sure to consult the latest edition.

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. **IARC**- International Agency for Research on Cancer **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. **NTP**- National Toxicology Program

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.