MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	**Harris 15 Low Fuming Bronze / Harris America Low Fuming Bronze**
Version #	02
Issue date	07-October-2013
Revision date	12-March-2014
Supersedes date	07-October-2013
CAS #	Mixture
Product use	Metal brazing.
Manufacturer information	
Manufacturer/Supplier	Harris Products Group 4501 Quality Place Mason, Ohio 45040 US custservmason@jwharris.com
Telephone number	513-754-2000
Emergency Telephone Numbers	1-888-609-1762 (US, Canada, Mexico only) Please quote 333988

2. Hazards Identification

Physical state	Solid.
Appearance	Bronze rods.
Emergency overview	WARNING May cause eye, skin and respiratory tract irritation. Toxic: danger of serious damage to health by prolonged exposure through inhalation.
OSHA regulatory status	Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.
Potential health effects	
Routes of exposure	Inhalation. Skin contact. Eye contact. Ingestion.
Eyes	Fumes from heated material may cause eye irritation. Dust may irritate the eyes. Exposure to hot material may cause thermal burns.
Skin	Dust may irritate skin. May cause allergic skin reaction. Exposure to hot material may cause thermal burns.
Inhalation	May cause respiratory tract irritation. Inhalation of fumes may cause a flu-like illness called metal fume fever.
Ingestion	Ingestion is not likely to be a primary route of occupational exposure.
Target organs	Respiratory system. Eyes. Skin. Central nervous system.
Chronic effects	Chronic inhalation of fumes or dust may cause irritation or other respiratory conditions (e.g., bronchitis). May cause lung damage. Overexposure to manganese fumes may affect the brain and central nervous system, resulting in poor coordination, difficulty speaking, and arm or leg tremor. This condition can be irreversible Excessive Zinc intake has been associated with copper deficiency anemia. Long-term exposure to copper compounds may cause anemia. Individuals with Wilson's disease are at an increased risk of copper poisoning. Refer to Section 11 Toxicological Information for more details.
Signs and symptoms	Contact may cause irritation and redness. Dust may irritate respiratory system. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Typical metal fume fever begins four to twelve hours after sufficient exposure to freshly formed fumes. The first symptoms are a metallic taste, dryness and irritation of the throat. Cough and shortness of breath may occur along with headache, fatigue, nausea, vomiting, muscle and joint pain, fever and chills. The syndrome runs its course in 24-48 hours.
Potential environmental effects	Alloys in massive forms present a limited hazard for the environment.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Copper	7440-50-8	56 - 60.5
Tin	7440-31-5	0.3 - 1.1
Iron	7439-89-6	0.0 - 1.2
Manganese	7439-96-5	0.01 - 0.5
Silicon	7440-21-3	< 0.3
Zinc	7440-66-6	Balance

Coating(s)	CAS #	Percent
Borax decahydrate	1303-96-4	10 - 30
Boric acid	10043-35-3	50 - 80
Methacrylate polymer	-	1 - 5

Composition comments

Rods may be coated with flux containing Boric acid (CAS 10043-35-3) and Borax (CAS 1303-96-4). It can be reasonably assumed that on coated rods each of the flux constituents may comprise up to 30% by mass of the total mass.

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures

Eye contact

Rinse immediately with plenty of water for at least 15 minutes. Remove any contact lenses. Get medical attention if irritation develops or persists.

Skin contact

Remove contaminated clothes and rinse skin thoroughly with water for at least 15 minutes. Get medical attention if irritation develops and persists.

Inhalation

Remove person from contaminated area to fresh air. Apply artificial respiration if needed. Call a physician if symptoms develop or persist.

Ingestion

Do NOT induce vomiting. Immediately rinse mouth and drink a cupful of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Notes to physician

Treat symptomatically.

General advice

Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties

Solid metal is not flammable; however, finely divided metallic dust or powder may form an explosive mixture with air. Do not use water on molten metal: Explosion hazard could result.

Extinguishing media

Suitable extinguishing media

Extinguish with foam, carbon dioxide or dry powder.

Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

Protection of firefighters

Specific hazards arising from the chemical

Fire or high temperatures create: Metal oxides.

Fire fighting equipment/instructions

Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Move containers from fire area if you can do it without risk.

6. Accidental Release Measures

Personal precautions

Keep unnecessary personnel away. Avoid inhalation of dust from the spilled material. Wear protective clothing as described in Section 8 of this MSDS. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Environmental precautions

Do not contaminate water.

Methods for containment

Stop leak if you can do so without risk. Local authorities should be advised if significant spillages cannot be contained.

Methods for cleaning up Collect for recycling. Avoid the generation of dusts during clean-up. For waste disposal, see Section 13 of the MSDS.

Other information Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling Avoid inhalation of dust and fumes. Avoid contact with skin and eyes. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Wear appropriate personal protective equipment (See Section 8). Do not eat, drink or smoke when using the product. Wash thoroughly after handling. Avoid release to the environment.

Storage Store in tightly closed original container in a dry, cool and well-ventilated place. Store in a closed container away from incompatible materials. Keep away from food, drink and animal feedingstuffs.

8. Exposure Controls / Personal Protection

Occupational exposure limits

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.
Coating(s)	**Type**	**Value**	**Form**
Boric acid (CAS 10043-35-3)	STEL	6 mg/m3	Inhalable fraction.
	TWA	2 mg/m3	Inhalable fraction.
Borax decahydrate (CAS 1303-96-4)	STEL	6 mg/m3	Inhalable fraction.
	TWA	2 mg/m3	Inhalable fraction.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	PEL	1 mg/m3	Dust and mist.
		0.1 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	PEL	10 mg/m3	Fume.
Manganese (CAS 7439-96-5)	Ceiling	5 mg/m3	Fume.
Silicon (CAS 7440-21-3)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
Tin (CAS 7440-31-5)	PEL	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	PEL	5 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		15 mg/m3	Total dust.

Canada. Alberta OELs (Occupational Health & Safety Code, Schedule 1, Table 2)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Tin (CAS 7440-31-5)	TWA	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable.
	TWA	2 mg/m3	Respirable.

Canada. British Columbia OELs. (Occupational Exposure Limits for Chemical Substances, Occupational Health and Safety Regulation 296/97, as amended)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	STEL	10 mg/m3	Fume.
	TWA	5 mg/m3	Fume.
		5 mg/m3	Dust.
		3 mg/m3	Respirable fraction.
		10 mg/m3	Total dust.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Tin (CAS 7440-31-5)	TWA	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable.
	TWA	2 mg/m3	Respirable.

Coating(s)	Type	Value	Form
Boric acid (CAS 10043-35-3)	STEL	6 mg/m3	Inhalable
	TWA	2 mg/m3	Inhalable
Borax decahydrate (CAS 1303-96-4)	STEL	6 mg/m3	Inhalable
	TWA	2 mg/m3	Inhalable

Canada. Manitoba OELs (Reg. 217/2006, The Workplace Safety And Health Act)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Manganese (CAS 7439-96-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.

Coating(s)	Type	Value	Form
Boric acid (CAS 10043-35-3)	STEL	6 mg/m3	Inhalable fraction.
	TWA	2 mg/m3	Inhalable fraction.
Borax decahydrate (CAS 1303-96-4)	STEL	6 mg/m3	Inhalable fraction.
	TWA	2 mg/m3	Inhalable fraction.

Canada. Ontario OELs. (Control of Exposure to Biological or Chemical Agents)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	0.2 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Respirable fraction.
Manganese (CAS 7439-96-5)	TWA	0.2 mg/m3	
Silicon (CAS 7440-21-3)	TWA	10 mg/m3	Total dust.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.

Coating(s)	Type	Value	Form
Boric acid (CAS 10043-35-3)	STEL	6 mg/m3	Inhalable fraction.
	TWA	2 mg/m3	Inhalable fraction.
Borax decahydrate (CAS 1303-96-4)	STEL	6 mg/m3	Inhalable fraction.
	TWA	2 mg/m3	Inhalable fraction.

Canada. Quebec OELs. (Ministry of Labor - Regulation Respecting the Quality of the Work Environment)

Components	Type	Value	Form
Copper (CAS 7440-50-8)	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	TWA	5 mg/m3	Dust and fume.
		10 mg/m3	Total dust.
Manganese (CAS 7439-96-5)	STEL	3 mg/m3	Fume.
	TWA	5 mg/m3	Dust.
		1 mg/m3	Fume.
Silicon (CAS 7440-21-3)	TWA	10 mg/m3	Total dust.
Tin (CAS 7440-31-5)	TWA	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Fume.
	TWA	5 mg/m3	Fume.
		10 mg/m3	Total dust.

Coating(s)	Type	Value
Borax decahydrate (CAS 1303-96-4)	TWA	5 mg/m3

Mexico. Occupational Exposure Limit Values

Components	Type	Value	Form
Copper (CAS 7440-50-8)	STEL	2 mg/m3	Dust and mist.
		2 mg/m3	Fume.
	TWA	1 mg/m3	Dust and mist.
		0.2 mg/m3	Fume.
Iron oxide (CAS 1309-37-1)	STEL	10 mg/m3	
	TWA	5 mg/m3	
Manganese (CAS 7439-96-5)	STEL	3 mg/m3	Fume.
	TWA	1 mg/m3	Fume.
		0.2 mg/m3	
Silicon (CAS 7440-21-3)	STEL	20 mg/m3	
	TWA	10 mg/m3	
Tin (CAS 7440-31-5)	STEL	4 mg/m3	
	TWA	2 mg/m3	
Zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Fume.
	TWA	5 mg/m3	Fume.
		10 mg/m3	Dust.

Coating(s)	Type	Value
Borax decahydrate (CAS 1303-96-4)	TWA	5 mg/m3

Engineering controls Provide adequate ventilation. Observe occupational exposure limits and minimize the risk of inhalation of dust and fumes. Shower, hand and eye washing facilities near the workplace are recommended.

Personal protective equipment

Eye / face protection Wear safety glasses with side shields (or goggles). 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.

Skin protection Protective clothing is recommended. When these products are used in conjunction with brazing, wear protective clothing that protects from sparks and flame (per ANSI Z49.1-1988, “Safety in Welding and Cutting”).

Respiratory protection Use a respirator when local exhaust or ventilation is not adequate to keep exposures below the TLV. In a confined space a supplied respirator may be required. Selection and use of respiratory protective equipment should be in accordance with OSHA General Industry Standard 29 CFR 1910.134; or in Canada with CSA Standard Z94.4. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical & Chemical Properties

Appearance	Bronze rods.
Physical state	Solid.
Form	Solid.
Color	Bronze.
Odor	Odorless.
Odor threshold	Not available.
pH	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Boiling point	Not available.
Melting point/Freezing point	1680 °F (915.56 °C)
Solubility (water)	Not available.
Specific gravity	Not available.
Flash point	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Auto-ignition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Strong acids. Strong bases. Acetylene. Ammonia. Hydrogen peroxide (H_2O_2). Chlorine. Bromine, iodine, turpentine, magnesium metal. Hydrogen sulfide. Ammonium nitrate.
Hazardous decomposition products	Toxic metal oxides are emitted when heated above the melting point. Coated rods may also release boric anhydride. Methacrylate polymer decomposes when heated and will release flammable vapors which irritate eyes and the respiratory system. They comprise mainly n-butyl methacrylate (CAS 97-88-1).
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Components	Species	Test Results
Iron (CAS 7439-89-6)		
Acute		
Oral		
LD50	Rat	30 g/kg
Manganese (CAS 7439-96-5)		
Acute		
Oral		
LD50	Rat	9000 mg/kg
Silicon (CAS 7440-21-3)		
Acute		
Oral		
LD50	Rat	3160 mg/kg
Zinc (CAS 7440-66-6)		
Acute		
Oral		
LD50	Rat	630 mg/kg

Coating(s)	Species	Test Results
Boric acid (CAS 10043-35-3)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
Oral		
LD50	Rat	2660 mg/kg
Borax decahydrate (CAS 1303-96-4)		
Acute		
Dermal		
LD50	Rabbit	> 10000 mg/kg

Sensitization Rare cases of allergic contact dermatitis have been reported in people working with copper dust.

Acute effects When heated, the vapors/fumes given off may cause respiratory tract irritation. High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever.

Local effects Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye, mucous membranes and respiratory tract.

Chronic effects Overexposure to manganese fumes may affect the brain and central nervous system, resulting in poor coordination, difficulty speaking, and arm or leg tremor. This condition can be irreversible Long-term exposure to copper compounds may cause anemia.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

ACGIH Carcinogens

Borax decahydrate (CAS 1303-96-4)	A4 Not classifiable as a human carcinogen.
Boric acid (CAS 10043-35-3)	A4 Not classifiable as a human carcinogen.
Manganese (CAS 7439-96-5)	A4 Not classifiable as a human carcinogen.

Epidemiology Based on epidemiological studies, pre-existing pulmonary disorders may be aggravated by prolonged exposure to high concentrations of metal dust or fumes.

Mutagenicity No data available.

Reproductive effects This product is not reported to cause reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of the Boric Acid and Copper components of this product indicate adverse reproductive effects.

12. Ecological Information

Ecotoxicological data

Components		Species	Test Results
Copper (CAS 7440-50-8)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia obtusa)	0.0076 - 0.026 mg/l, 48 hours
Iron (CAS 7439-89-6)			
Aquatic			
Fish	LC50	Channel catfish (Ictalurus punctatus)	> 500 mg/l, 96 hours
Zinc (CAS 7440-66-6)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	2.8 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.56 mg/l, 96 hours

Coating(s)		Species	Test Results
Boric acid (CAS 10043-35-3)			
Aquatic			
Fish	LC50	Razorback sucker (Xyrauchen texanus)	> 100 mg/l, 96 hours

Ecotoxicity Alloys in massive forms present a limited hazard for the environment.

Environmental effects Significant environmental persistence and bioaccumulation can be expected.

Aquatic toxicity	If in form of particles or dust, some metals of the alloy are hazardous to aquatic organisms and/or may cause long-term adverse effects in the aquatic environment.
Persistence and degradability	The product is not biodegradable.
Bioaccumulation / Accumulation	The product contains potentially bioaccumulating substances.
Mobility in environmental media	Alloys in massive forms are not mobile in the environment.

13. Disposal Considerations

Disposal instructions	Dispose in accordance with all applicable regulations.
Waste from residues / unused products	Recover and recycle, if practical. Solid metal and alloys in the form of particles may be reactive. Its hazardous characteristics, including fire and explosion, should be determined prior to disposal.

14. Transport Information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations

Under some use conditions, this material may be considered to be hazardous in accordance with OSHA 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Manganese (CAS 7439-96-5)

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Copper (CAS 7440-50-8)	1.0 %
Manganese (CAS 7439-96-5)	1.0 %
Zinc (CAS 7440-66-6)	1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Copper: 5000
Zinc: 1000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical

Yes

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)

Not controlled

Canadian regulations

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.

WHMIS status

Controlled

WHMIS classification D2A - Other Toxic Effects-VERY TOXIC

WHMIS labeling

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Hazardous Substances (Director's): Listed substance

Borax decahydrate (CAS 1303-96-4)	Listed.
Copper (CAS 7440-50-8)	Listed.
Iron (CAS 7439-89-6)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Tin (CAS 7440-31-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

US. Massachusetts RTK - Substance List

Borax decahydrate (CAS 1303-96-4)	Listed.
Copper (CAS 7440-50-8)	Listed.
Manganese (CAS 7439-96-5)	Listed.
Silicon (CAS 7440-21-3)	Listed.
Tin (CAS 7440-31-5)	Listed.
Zinc (CAS 7440-66-6)	Listed.

US. New Jersey Worker and Community Right-to-Know Act

Borax decahydrate (CAS 1303-96-4)
Boric acid (CAS 10043-35-3)
Copper (CAS 7440-50-8)
Manganese (CAS 7439-96-5)
Silicon (CAS 7440-21-3)
Tin (CAS 7440-31-5)
Zinc (CAS 7440-66-6)

US. Pennsylvania Worker and Community Right-to-Know Law

Borax decahydrate (CAS 1303-96-4)
Copper (CAS 7440-50-8)
Manganese (CAS 7439-96-5)
Silicon (CAS 7440-21-3)
Tin (CAS 7440-31-5)
Zinc (CAS 7440-66-6)

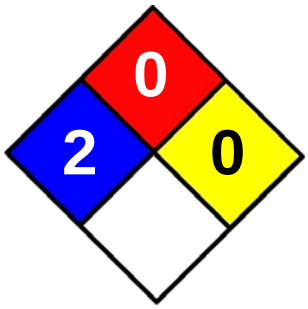
Mexico regulations This safety data sheet was prepared in accordance with the Official Mexican Standard (NOM-018-STPS-2000).

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings Health: 2*
Flammability: 0
Physical hazard: 0

NFPA Ratings



Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available.