SAFETY DATA SHEET

1. Identification

Product identifier

Bismuth Alloys

Other means of identification

SDS number

111

Product code

C89320, C89325, C89510, C89360, C89520, C89530, C89831, C89833, C89835, C89836, C89837

Recommended use

Manufacturing

Recommended restrictions

Not assigned.

Manufacturer / Importer / Supplier / Distributor information

Company name

United Bronze of Pittsburgh Inc.

Address

P. O. Box 317, Creighton, PA 15030

Telephone

724-226-8500

Contact person

Bob Orringer

E-mail

bronze713@aol.com

Emergency phone number

724-226-8500

2. Hazard(s) identification

Physical hazards

Not classified.

Health hazards

Sensitization, skin Category 1
Carcinogenicity Category 2
Specific target organ toxicity, repeated exposure Category 2 (Lung)

OSHA hazard(s)

Not classified.

Label elements

Hazard symbol

Signal word

Warning

Hazard statement

May cause an allergic skin reaction. Suspected of causing cancer. May cause damage to organs
(Lung) through prolonged or repeated exposure by inhalation.

Precautionary statement

Prevention

Obtain special instructions before use. Do not handle until all safety precautions have been read
and understood. Use personal protective equipment as required. Contaminated work clothing
should not be allowed out of the workplace. Wear protective gloves/protective clothing. Do not
breathe fumes and dusts.

Response

If on skin: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical
advice/attention. Specific treatment (see this label). Wash contaminated clothing before reuse. If
exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel
unwell.

Storage

Store locked up.

Disposal

Dispose of contents/container to a facility that has permission of disposing the industrial waste.

Hazard(s) not otherwise classified (HNOC)

Not classified.

3. Composition/information on ingredients

Mixture

Hazardous components

Chemical name

Common name and synonyms

CAS number

%

Copper

7440-50-8

85-91

Tin

7440-31-5

4-7.5
### Hazardous components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bismuth</td>
<td></td>
<td>7440-69-9</td>
<td>0.5-6</td>
</tr>
<tr>
<td>Selenium</td>
<td></td>
<td>7782-49-2</td>
<td>0-1.1</td>
</tr>
<tr>
<td>Nickel</td>
<td></td>
<td>7440-02-0</td>
<td>0-1</td>
</tr>
</tbody>
</table>

**Composition comments**

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. The alloy contains additional alloying elements at concentrations below disclosure requirements. At temperatures above the melting point the alloys may liberate fumes containing oxides of alloying elements.

### 4. First-aid measures

**Inhalation**

In case of exposure to fumes or particulates: Move to fresh air. Get medical attention if discomfort persists.

**Skin contact**

Contact with dust: Wash skin with soap and water. In case of allergic reaction or other skin disorders: Seek medical attention and bring along these instructions. In case of contact with hot or molten product, cool rapidly with water and seek immediate medical attention. Do not attempt to remove molten product from skin because skin will tear easily. Cuts or abrasions should be treated promptly with thorough cleansing of the affected area.

**Eye contact**

Do not rub eyes. Remove any contact lenses. Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.

**Ingestion**

Rinse mouth thoroughly if dust is ingested. Only induce vomiting at the instruction of medical personnel. Get medical attention if any discomfort continues.

**Most important symptoms/effects, acute and delayed**


**Indication of immediate medical attention and special treatment needed**

Treat symptomatically. Symptoms may be delayed.

**General information**

Get medical attention if any discomfort develops. Seek medical attention for all burns, regardless how minor they may seem. Show this safety data sheet to the doctor in attendance.

### 5. Fire-fighting measures

**Suitable extinguishing media**

Special powder against metal fires. Dry sand.

**Unsuitable extinguishing media**

Do not use water or halogenated extinguishing media. Do not use water on molten metal: Explosion hazard could result.

**Specific hazards arising from the chemical**

During fire, gases hazardous to health may be formed. Solid metal is not flammable; however, finely divided metallic dust or powder may form an explosive mixture with air. In a fire, nickel may form nickel carbonyl, a highly toxic substance and known carcinogen.

**Special protective equipment and precautions for firefighters**

Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

**Fire-fighting equipment/instructions**

Move containers from fire area if you can do it without risk.

### 6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**

Ensure adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet.

**Methods and materials for containment and cleaning up**

Avoid dust formation. Allow spilled material to solidify and scrape up with shovels into a suitable container for recycle or disposal. Collect dust using a vacuum cleaner equipped with HEPA filter. The vacuum cleaner should be explosion-proofed. If not possible, gently moisten dust before it is collected with shovel, broom or the like. This material and its container must be disposed of as hazardous waste.

**Environmental precautions**

Avoid release to the environment. Do not contaminate water.
7. Handling and storage

Precautions for safe handling

Welding, burning, sawing, brazing, grinding or machining operations may generate fumes and dusts of metal oxides. Provide adequate ventilation. Avoid contact with sharp edges and hot surfaces. Avoid inhalation of dust and contact with skin and eyes. Avoid generation and spreading of dust and fumes. Avoid contact with hot or molten material. Dust clouds may be explosive under certain conditions. Take precautionary measures against static discharges when there is a risk of dust explosion. Use explosion-proof electrical equipment if airborne dust levels are high. To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Wear appropriate personal protective equipment. Do not use water on molten metal. Do not eat, drink or smoke when using the product. Keep the workplace clean. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Keep dry. Store away from incompatible materials.

8. Exposure controls/personal protection

Occupational exposure limits

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

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (CAS 7440-50-8)</td>
<td>PEL</td>
<td>1 mg/m3</td>
<td>Dust and mist.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.1 mg/m3</td>
<td>Fume.</td>
</tr>
<tr>
<td>Nickel (CAS 7440-02-0)</td>
<td>PEL</td>
<td>1 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Selenium (CAS 7782-49-2)</td>
<td>PEL</td>
<td>0.2 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Tin (CAS 7440-31-5)</td>
<td>PEL</td>
<td>2 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

US. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (CAS 7440-50-8)</td>
<td>TWA</td>
<td>1 mg/m3</td>
<td>Dust and mist.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.2 mg/m3</td>
<td>Fume.</td>
</tr>
<tr>
<td>Nickel (CAS 7440-02-0)</td>
<td>TWA</td>
<td>1.5 mg/m3</td>
<td>Inhalable fraction.</td>
</tr>
<tr>
<td>Selenium (CAS 7782-49-2)</td>
<td>TWA</td>
<td>0.2 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Tin (CAS 7440-31-5)</td>
<td>TWA</td>
<td>2 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

US. NIOSH: Pocket Guide to Chemical Hazards

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (CAS 7440-50-8)</td>
<td>REL</td>
<td>1 mg/m3</td>
<td>Dust and mist.</td>
</tr>
<tr>
<td>Nickel (CAS 7440-02-0)</td>
<td>REL</td>
<td>0.015 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Selenium (CAS 7782-49-2)</td>
<td>REL</td>
<td>0.2 mg/m3</td>
<td></td>
</tr>
<tr>
<td>Tin (CAS 7440-31-5)</td>
<td>REL</td>
<td>2 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

Biological limit values

No biological exposure limits noted for the ingredient(s).

Exposure guidelines

Follow standard monitoring procedures.

Appropriate engineering controls

Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust. Ventilate as needed to control airborne dust. Use explosion-proof ventilation equipment if airborne dust levels are high. Special ventilation should be used to convey finely divided metallic dust generated by grinding, sawing etc., in order to eliminate explosion hazards.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear dust-resistant safety goggles where there is danger of eye contact. In addition to safety glasses or goggles, a welding helmet with appropriate shaded shield is required during welding, burning, or brazing. A face shield is recommended, in addition to safety glasses or goggles, during sawing, grinding, or machining.

Skin protection

Hand protection

Wear suitable protective gloves to prevent cuts and abrasions. When material is heated, wear gloves to protect against thermal burns. Suitable gloves can be recommended by the glove supplier.

Other

Wear suitable protective clothing.

Respiratory protection

In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. When engineering controls are not sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH approved respirator for dusts. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use. Seek advice from local supervisor.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.
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. Contaminated uniforms should be laundered separately from other clothing to prevent potential cross-contamination. If possible, an industrial laundry service should be used to eliminate the possibility of contaminating the home environment. Handle in accordance with good industrial hygiene and safety practices. Observe any medical surveillance requirements.

9. Physical and chemical properties

Appearance
Shapes, Solids, Tubes & Turnings.

Physical state
Solid.

Form
Shapes, Solids, Tubes & Turnings.

Color
Yellow to red.

Odor
None.

Odor threshold
Not available.

pH
Unknown.

Melting point/freezing point
1725.8 °F (941 °C)

Initial boiling point and boiling range
Not available.

Flash point
Not available.

Vapor pressure
Not available.

Vapor density
Not available.

Relative density
Not available.

Solubility(ies)
Insoluble in water.

Partition coefficient (n-octanol/water)
Not available.

Auto-ignition temperature
Not available.

Decomposition temperature
Not available.

Viscosity
Not available.

Other information

Bulk density
0.313 - 0.323 lb/in³

10. Stability and reactivity

Reactivity
Not available.

Chemical stability
Stable at normal conditions. Massive metal is stable and non reactive under normal conditions of use, storage and transport.

Possibility of hazardous reactions
Hazardous polymerization does not occur. Hot molten material will react violently with water resulting in spattering and fuming.

Conditions to avoid
Contact with incompatible materials. Contact with acids will release flammable hydrogen gas. Avoid dust formation. Dust clouds may be explosive under certain conditions.

Incompatible materials

Hazardous decomposition products
Welding, burning, sawing, brazing, grinding or machining operations may generate dusts and fumes of metal oxides. Phosphorus oxides. Selenium/selenium oxides.

11. Toxicological information

Information on likely routes of exposure

Ingestion
Not relevant, due to the form of the product. However, ingestion of dusts generated during working operations may cause nausea and vomiting.
Inhalation Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the mucous membranes and respiratory tract. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea.

Skin contact May cause an allergic skin reaction. Hot or molten material may produce thermal burns. Workers allergic to nickel may develop eczema or rashes. Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea.

Eye contact Molten material will produce thermal burns. Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye.

Symptoms related to the physical, chemical and toxicological characteristics May cause irritation to mucous membranes. May cause skin and eye irritation. Coughing. Wheezing. Shortness of breath. Sensitization.

Information on toxicological effects

Acute toxicity High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever. Acute exposure to dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea.

Skin corrosion/irritation Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye, mucous membranes and respiratory tract. Hot or molten material may produce thermal burns.

Serious eye damage/eye irritation Dust from machining operation in the eyes may cause irritation.

Respiratory sensitization Not classified.

Skin sensitization Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. May cause sensitization by skin contact. Pre-existing skin conditions including dermatitis might be aggravated by exposure to this product.

Germ cell mutagenicity No data available.

Carcinogenicity Suspected of causing cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Nickel (CAS 7440-02-0) 1 Carcinogenic to humans.
Selenium (CAS 7782-49-2) 3 Not classifiable as to carcinogenicity to humans.

NTP Report on Carcinogens

Nickel (CAS 7440-02-0) Known To Be Human Carcinogen. Reasonably Anticipated to be a Human Carcinogen.

Reproductive toxicity Nickel: Has shown teratogenic effects in laboratory animals.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure Causes damage to the following organs through prolonged or repeated exposure: Lung.

Aspiration hazard Not available.

Chronic effects Harmful: danger of serious damage to health by prolonged exposure through inhalation. Chronic inhalation of high concentrations of iron oxide fumes or dust may lead to benign pneumoconiosis (siderosis). Prolonged and repeated overexposure to dust and fumes can lead to benign pneumoconiosis (stannosis). Chronic inhalation of metallic oxide dust/fume may cause metal fume fever.

Further information Welding or plasma arc cutting of metal and alloys can generate ozone, nitric oxides and ultraviolet radiation. Ozone overexposure may result in mucous membrane irritation or pulmonary discomfort. UV radiation can cause skin erythema and welders flash.

12. Ecological information

Ecotoxicity Alloys in massive forms present a limited hazard for the environment. The product contains a substance which may cause long-term adverse effects in the environment.

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selenium (CAS 7782-49-2)</td>
<td>Fish</td>
<td>LC50 Fathead minnow (Pimephales promelas) 0.94 - 1.2 mg/l, 96 hours</td>
</tr>
</tbody>
</table>

Persistence and degradability The product is not biodegradable.

Bioaccumulative potential The product contains potentially bioaccumulating substances.

Mobility in soil Alloys in massive forms are not mobile in the environment.

Mobility in general Alloys in massive forms are not mobile in the environment.

Other adverse effects An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
13. Disposal considerations

Disposal instructions
This material and its container must be disposed of as hazardous waste. Dispose in accordance with all applicable regulations.

Local disposal regulations
Dispose in accordance with all applicable regulations.

Hazardous waste code
Z110: Inorganic compounds n.o.s.

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.

Contaminated packaging
Not applicable.

14. Transport information

DOT
Not regulated as a hazardous material by DOT.

IATA
Not regulated as a dangerous good.

IMDG
Not regulated as a dangerous good.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
No information available.

15. Regulatory information

US federal regulations
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not on regulatory list.

CERCLA Hazardous Substance List (40 CFR 302.4)

<table>
<thead>
<tr>
<th>Substance</th>
<th>List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (CAS 7440-50-8)</td>
<td>LISTED</td>
</tr>
<tr>
<td>Nickel (CAS 7440-02-0)</td>
<td>LISTED</td>
</tr>
<tr>
<td>Selenium (CAS 7782-49-2)</td>
<td>LISTED</td>
</tr>
</tbody>
</table>

Superfund Amendments and Reauthorization Act of 1986 (SARA)

<table>
<thead>
<tr>
<th>Hazard categories</th>
<th>SARA 302 Extremely hazardous substance</th>
<th>SARA 311/312 Hazardous chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate Hazard - Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Delayed Hazard - Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Hazard - No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Hazard - No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactivity Hazard - No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Nickel (CAS 7440-02-0)
Selenium (CAS 7782-49-2)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.

Safe Drinking Water Act (SDWA)
Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number
Not listed.

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))
Not regulated.

DEA Exempt Chemical Mixtures Code Number
Not regulated.

Food and Drug Administration (FDA)
Not regulated.

US state regulations
WARNING: This product contains a chemical known to the State of California to cause cancer.
US. Massachusetts RTK - Substance List
Copper (CAS 7440-50-8)
Nickel (CAS 7440-02-0)
Selenium (CAS 7782-49-2)
Tin (CAS 7440-31-5)

US. New Jersey Worker and Community Right-to-Know Act
Copper (CAS 7440-50-8) 500 LBS
Nickel (CAS 7440-02-0) 500 LBS
Selenium (CAS 7782-49-2) 500 LBS

US. Pennsylvania RTK - Hazardous Substances
Copper (CAS 7440-50-8)
Nickel (CAS 7440-02-0)
Selenium (CAS 7782-49-2)
Tin (CAS 7440-31-5)

US. Rhode Island RTK
Copper (CAS 7440-50-8)
Nickel (CAS 7440-02-0)
Selenium (CAS 7782-49-2)
Tin (CAS 7440-31-5)

US. California Proposition 65
US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
Nickel (CAS 7440-02-0)

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>No</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List of (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

16. Other information, including date of preparation or last version

Issue date: June 01, 2015

Version # 1.0

Further information Not available.

References
- HSDB® - Hazardous Substances Data Bank
- IARC Monographs. Overall Evaluation of Carcinogenicity
- National Toxicology Program (NTP) Report on Carcinogens
- ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer
The information in this MSDS was obtained from industry sources that we believe to be reliable. However, the information is provided without any representation or warranty, expressed or implied regarding the accuracy or correctness. The conditions or methods of handling, storage, use, and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of the product.

Bismuth Alloys SDS
#110 Version: 1.0
Issue date: June 01, 2015