**CROWN ALLOYS COMPANY**

**SAFETY DATA SHEET**

### Section 1 – PRODUCT AND COMPANY IDENTIFICATION

<table>
<thead>
<tr>
<th>PRODUCT NAME:</th>
<th>Copper-Tin Covered Electrode</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT IDENTIFICATION:</td>
<td>ROYAL 3100</td>
</tr>
<tr>
<td>SPECIFICATION:</td>
<td>N/A</td>
</tr>
<tr>
<td>RECOMMENDED USE:</td>
<td>SMAW (Shielded Metal Arc Welding)</td>
</tr>
<tr>
<td>SUPPLIER:</td>
<td>Crown Alloys Company 30105 Stephenson Hwy. Madison Heights, MI. 48071</td>
</tr>
<tr>
<td>TELEPHONE NUMBER:</td>
<td>(248) 588-3790</td>
</tr>
<tr>
<td>EMERGENCY NUMBER:</td>
<td>Call CHEMTREC Day or Night 1-800-424-9300 / +1 703-527-3887</td>
</tr>
<tr>
<td>WEBSITE:</td>
<td><a href="http://www.crownalloys.com">www.crownalloys.com</a></td>
</tr>
</tbody>
</table>

### Section 2 – HAZARDS IDENTIFICATION

#### 2.1 Classification of the mixture

This product is placed on the market in solid form

#### 2.1.1 Classification in accordance with GHS-US

<table>
<thead>
<tr>
<th>Acute Tox. 4 (Oral)</th>
<th>H302</th>
<th>STOT SE 3</th>
<th>H336</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Irrit. 2</td>
<td>H315</td>
<td>Carc. 2</td>
<td>H351</td>
</tr>
<tr>
<td>Skin Sens. 1</td>
<td>H317</td>
<td>Repr. Tox. Lact.</td>
<td>H362</td>
</tr>
<tr>
<td>Eye Irrit. 2A</td>
<td>H319</td>
<td>STOT RE 1</td>
<td>H372</td>
</tr>
<tr>
<td>STOT SE 3</td>
<td>H335</td>
<td>Aquatic Acute 1</td>
<td>H400</td>
</tr>
</tbody>
</table>

#### 2.2 Label elements

**GHS-US labelling**

- **Hazard Pictograms (GHS-US):**
  - GHS07
  - GHS08
  - GHS09

- **Signal word (GHS-US):** Danger

- **Hazard statements (GHS-US):**
  - H302 – Harmful if swallowed
  - H317 – May cause an allergic skin reaction
  - H315 – Causes skin irritation
  - H319 – Causes serious eye irritation
  - H335 – May cause respiratory irritation
  - H336 – May cause drowsiness or dizziness
  - H351 – Suspected of causing cancer
  - H362 – May cause harm to breast-fed children
  - H372 – Causes damage to organs through prolonged or repeated exposure
  - H400 – Very toxic to aquatic life

- **Precautionary statements (GHS-US):**
  - P201 – Obtain special instructions before use
  - P202 – Do not handle until all safety precautions have been read and understood
  - P260 – Do not breathe dust/fume/gas/mist/vapors/spray
  - P261 – Avoid breathing dust/fume/gas/mist/vapors/spray
  - P264 – Wash thoroughly after handling
  - P270 – Do not eat, drink or smoke when using this product
  - P272 – Contaminated work clothing should not be allowed out of the workplace
  - P273 – Avoid release to the environment
  - P280 – Wear protective gloves/protective clothing/eye protection/face protection
  - P285 – In case of inadequate ventilation wear respiratory protection
  - P301+P312 – If swallowed: Call a poison center or physician if you feel unwell
  - P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  - P308+P331+P337+P353+P313+P314 – IF EXPOSED OR CONCERNED: Get medical advice/attention
  - P311 – Get medical advice and attention if you feel unwell
  - P321 – Specific treatment (see label)
  - P333–P337+P313 – If skin irritation or rash occurs: Get medical advice/attention
  - P362+P364 – Take off contaminated clothing and wash it before reuse
  - P362–P364+P335+P313 – Specific decontamination measures
  - P391 – Collect spillage
  - P403+P233 – Store in a well-ventilated place. Keep container tightly closed
  - P405 – Store locked up
  - P501– P505 – Disposal of packaging/contents: Refer to local/ regional/ national/ international regulations
2.3  Other hazards
No additional information available

2.4  Unknown acute toxicity (GHS-US)
No data available

Other hazards which do not result in GHS classification:
- Electrical shock can kill.
- Arc rays can injure eyes and burn skin.
- Welding arc and sparks can ignite combustibles and flammable materials.
- Overexposure to welding fumes and gases can be hazardous.

Read and understand the manufacturer's instructions, Safety Data Sheets and the precautionary labels before using these alloys. Refer to Section 8.

Substance(s) formed under the conditions of use:
The welding fumes produced from these welding alloys may contain the following constituent(s) and/or their complex metallic oxides as well as solid particles or other constituents from the consumables, base metal, or base metal coating not listed below:

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>CAS-No.</th>
<th>Weight Percent (%)</th>
<th>GHS-US Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>124-38-9</td>
<td>60.0 – 96.0</td>
<td>Comb. Dust Aquatic Acute 1, H400 Aquatic Chronic 3, H412</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>630-08-0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ozone</td>
<td>10028-15-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen Dioxide</td>
<td>10102-44-0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>2.00 max.</td>
<td>Skin Sens. 1, H317 Carc. 1B, H350 STOT RE 1, H372 T; R48/23 – R43 – R40*</td>
</tr>
<tr>
<td>Fluorides (as F)</td>
<td>16994-48-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tin (Sn)</td>
<td>7440-31-5</td>
<td>3.00 – 7.00</td>
<td>Not classified</td>
</tr>
<tr>
<td>Flux</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS

3.1  Substances
Not applicable

Full text of H-phrases: See section 16 Full text of R-phrases*: See section 16 Full text of S-phrases: See section 16

3.2  Mixture
Reportable Hazardous Ingredients

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>CAS-No.</th>
<th>Weight Percent (%)</th>
<th>GHS-US Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (Cu)</td>
<td>7440-50-8</td>
<td>60.0 – 96.0</td>
<td>Comb. Dust Aquatic Acute 1, H400 Aquatic Chronic 3, H412</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>7439-89-6</td>
<td>5.00 max.</td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>7440-02-0</td>
<td>2.00 max.</td>
<td>Skin Sens. 1, H317 Carc. 1B, H350 STOT RE 1, H372 T; R48/23 – R43 – R40*</td>
</tr>
<tr>
<td>Tin (Sn)</td>
<td>7440-31-5</td>
<td>3.00 – 7.00</td>
<td>Not classified</td>
</tr>
<tr>
<td>Calcium carbonate, Limestone</td>
<td>1317-65-3</td>
<td>3.00 – 7.00</td>
<td>Not classified</td>
</tr>
<tr>
<td>Potassium cryolite</td>
<td>13775-52-5</td>
<td>0.50 – 1.50</td>
<td>Not classified</td>
</tr>
<tr>
<td>Sodium cryolite</td>
<td>15096-52-3</td>
<td>7.00 – 13.0</td>
<td>T; R48/23/25* Xn; R20/22* N; R51/53*</td>
</tr>
<tr>
<td>Sodium fluoride</td>
<td>7681-49-4</td>
<td>0.50 – 1.50</td>
<td>Acute Tox. 3, H301 Skin Irrit. 2, H315 Eye Irrit. 2, H319 T; R25* Xi; R36/38 – R32*</td>
</tr>
<tr>
<td>Sodium silicate</td>
<td>1344-09-8</td>
<td>1.00 – 5.00</td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
</tbody>
</table>

Other components which may be present: Flux

Composition Comments: The term “Hazardous Ingredients” should be interpreted as a term defined in Hazard Communication standards and does not necessarily imply the existence of a welding hazard. These alloys may contain additional non-hazardous ingredients or may form additional compounds under the condition of use. Refer to Sections 2 & 8 for more information.

Section 4 – FIRST AID MEASURES

4.1  Description of first aid measures

Ingestion: Unlikely due to the form of the product. Avoid hand, clothing, food, and drink contact with metal fume or powder which can cause ingestion of particulate during hand to mouth activities such as drinking, eating, smoking, etc. If ingested, do not induce vomiting. Contact a poison control center. If symptoms develop, seek medical attention at once.

Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical assistance immediately.

Skin Contact: Wash affected area with soap and water to remove dust or particles. If a rash develops, see a physician. For skin burns from arc radiation or thermal burns, promptly flush with cold water. Get medical attention for burns or for irritations that persist.
Eye Contact: Dust or fume from this alloy should be flushed from the eyes with clean, tepid water until transported to a medical facility. Do not rub eyes or keep eyes tightly closed. Obtain immediate medical assistance. Arc rays can injure eyes. If exposed, move victim to a dark room, remove contact lenses and cover eyes with a padded dressing and rest. Obtain medical assistance if symptoms persist.

4.2 Most important symptoms/effects, acute and delayed
Symptoms/injuries after inhalation: No adverse effects are expected from welding consumables until they are welded. Short-term (acute) overexposure to the gases, fumes, and dusts may include irritation of the eyes, lungs, nose, and throat. Some toxic gases associated with welding may cause pulmonary edema, asphyxiation, and death. Individuals with Wilson's disease are at increased risk of copper poisoning. Acute (short-term) exposure to copper may cause respiratory tract irritation, fever, muscle ache, chills, weakness, cough, and a metallic taste. Copper poisoning can result in hemolytic anemia and kidney, liver and spleen damage. Acute overexposure may include signs and symptoms such as watery eyes, nose and throat irritation, headache, dizziness, difficulty in breathing, frequent coughing, or chest pain. The presence of nickel compounds in the fume can cause metallic taste, nausea, tightness of chest, fever, and allergic reaction. Fluoride compounds produced may cause eye and skin burns, and pulmonary edema bronchitis. Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death. Chronic overexposure to fluorides can cause serious bone erosion, excessive calcification of the bone and calcification of the ribs, pelvis and spinal column.

Symptoms/injuries after skin contact: Dusts may cause irritation. Chronic overexposure to fluorides may cause a skin rash.
Symptoms/injuries after eye contact: Causes eye irritation.
Symptoms/injuries after ingestion: Not an anticipated route of exposure during normal product handling. May be harmful if ingested. Ingestion of large amounts of copper may be fatal.

4.3 Indication of immediate medical attention and special treatment needed
No additional information available

Section 5 – FIRE-FIGHTING MEASURES

General Fire Hazards: As shipped, this product is nonflammable. However, welding arc and sparks can ignite combustibles and flammable products. Read and understand American National Standard Z49.1, "Safety In Welding, Cutting and Allied Processes” and National Fire Protection Association NFPA 51B, “Standard for Fire Prevention During Welding, Cutting and Other Hot Work” before using this product.

5.1 Extinguishing media
Suitable extinguishing media: Use extinguishing media appropriate for surrounding fire.
Unsuitable extinguishing media: None.

5.2 Special hazards arising from the substance
Fire hazard: Not flammable. When involved in a fire, this product may generate irritating fumes containing copper, iron compounds, metal oxides, nickel compounds and a variety of metal compounds. The molten material can present a significant thermal hazard to firefighters.

Explosion hazard: None known.

5.3 Special protective equipment and precautions for firefighters
Special firefighting procedures: Use standard firefighting procedures and consider the hazards of other involved materials.
Special protective equipment for firefighters: Firefighters should wear full protective gear (self-contained breathing apparatus) as fumes or vapors may be harmful.

Section 6 – ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8.

6.2 Environmental precautions
Avoid release to the environment. Do not flush residue into waterways.

6.3 Methods and material for containment and cleaning up
Clean up spills immediately, observing precautions in the personal protective equipment in Section 8. Avoid generating dust. Prevent product from entering any drains, sewers or water sources. Refer to Section 13 for proper disposal. Attempt to reclaim the product if possible.

Section 7 – HANDLING AND STORAGE

7.1 Precautions for safe handling

7.2 Conditions for safe storage, including any incompatibilities
Keep material sealed and dry before use and do not remove product identification label or warning label. Store in closed original container in a dry place. Store away from incompatible materials. Store in accordance with local/regional/national regulations.
8.1 Control parameters

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>ACGIH TLV (TWA)</th>
<th>OSHA PEL (TWA)</th>
<th>NIOSH REL</th>
<th>NIOSH STEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>0.2 mg/m³ (fume, as Cu)</td>
<td>0.1 mg/m³ (fume, as Cu)</td>
<td>2.5 mg/m³ (as F)</td>
<td>1 mg/m³</td>
</tr>
<tr>
<td>Iron</td>
<td>5.0 mg/m³ (as Fe₂O₃) respirable fraction</td>
<td>10.0 mg/m³ (fume, as Fe₂O₃)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Nickel</td>
<td>1.5 mg/m³ as metal (inhalable fraction)</td>
<td>1.0 mg/m³ (metal and insoluble compounds as Ni)</td>
<td>0.015 mg/m³</td>
<td>N/A</td>
</tr>
<tr>
<td>Tin</td>
<td>2.0 mg/m³</td>
<td>2.0 mg/m³</td>
<td>2.0 mg/m³</td>
<td>N/A</td>
</tr>
<tr>
<td>Calcium carbonate</td>
<td>10.0 mg/m³</td>
<td>5.0 mg/m³ (dust)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Potassium cryolite</td>
<td>2.5 mg/m³ (as F)</td>
<td>2.5 mg/m³ (as F)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Sodium cryolite</td>
<td>2.5 mg/m³ (as F)</td>
<td>2.5 mg/m³ (as F)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Sodium fluoride</td>
<td>2.5 mg/m³ (as F)</td>
<td>2.5 mg/m³ (as F)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Sodium silicate</td>
<td>Not listed</td>
<td>Not listed</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

General Information: Exposure Guidelines: Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) are values published by the American Conference of Government Industrial Hygienists (ACGIH). ACGIH Statement of Positions Regarding the TLVs and BEIs states that the TLV-TWA should be used as a guide in the control of health hazards and should not be used to indicate a fine line between safe and dangerous exposures. See Section 10 for information on potential fume constituents of health interest. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists.

Appropriate Engineering Controls:
Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases from the worker's breathing zone & the general area. Maintain exposures below acceptable exposure levels (see Section 8.1). Use industrial hygiene air monitoring to ensure that your use of these products does not create exposures that exceed the recommended exposure limits. Always use exhaust ventilation in user operations such as high temperature cutting, grinding, welding and brazing. Train the welder to keep his head out of the fume plume. Confined spaces require adequate ventilation and/or air supplied respirators. Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standard Z49.1. Safety in Welding, Cutting, and Allied Processes, published by the American Welding Society, 8669 Doral Blvd. Suite 130, Doral, FL 33166 and OSHA Publication 2206 (29CFR1910), US Government Printing Office, Washington, D.C. 20402 for more details on many of the following.

Eye/face protection: Wear helmet or use face shield with filter lens shade number 12 or darker for open arc processes. No specific lens shade recommendation for submersed arc processes. Use protective shields by providing screens and flash goggles.

Skin/Hand Protection: Wear protective gloves. Suitable gloves can be recommended by the glove supplier.

Protective Clothing:
Wear hand, head, and body protection which help to prevent injury from radiation, sparks and electrical shock. See Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Wear dry gloves free of holes or split seams. Train the welder not to permit electrically live parts or electrodes to contact skin . . . or clothing or gloves if they are wet. Insulate yourself from the work piece and ground using dry plywood, rubber mats or other dry insulation.

Respiratory Protection:
Keep your head out of fumes. Use enough ventilation and local exhaust to keep fumes and gases from your breathing zone and the general area. An approved respirator should be used unless exposure assessments are below applicable exposure limits. Use respirable fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below TLV's (see Section 8.1). Use only NIOSH approved respirators in accordance with 29 CFR 1910.134 – Respiratory Protection. 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).

Hygiene measures: Do not eat, drink or smoke when using the product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Cosmetics should not be applied in areas where exposures exist! Routinely wash work clothing and protective equipment to remove contaminants. Determine the composition and quantity of fumes and gases to which workers are exposed by taking an air sample from inside the welder's helmet if worn or in the worker's breathing zone. Improve ventilation if exposures are not below limits. See ANSI/AWS F1.1, F1.2, F1.3 and F1.5, available from the American Welding Society, www.aws.org.
Welding/brazing consumables.

Inhalation: Health injuries from ingestion are not known or expected under normal use.

Inhalation: Potential chronic health hazards related to the use of welding consumables are most applicable to the inhalation route of exposure. Refer to Inhalation statements in this section.

Skin Contact: Arc rays can burn skin. Skin cancer has been reported.

Eye contact: Arc rays can injure eyes.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation: Short-term (acute) exposure to welding fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Long-term (chronic) exposure to welding fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects. Fluoride compounds produced may cause eye and skin burns, and pulmonary edema bronchitis. Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death. Chronic overexposure to fluorides can cause serious bone erosion, excessive calcification of the bone and calcification of the ribs, pelvis and spinal column.
Information on toxicological effects

Acute toxicity (list all possible routes of exposure):

| Specified substance: COPPER and compounds (as Cu) | LD50 (oral, rat) = 481 mg/kg | LD50 (inhalation, rat) > 5.11 mg/l/4 hr |
| Specified substance: CALCIUM CARBONATE | LD50 (oral, rat) > 2000 mg/kg | LC50 (inhalation, rat) > 3 mg/l/4 hr |
| Specified substance: IRON | LD50 (oral, rat) = 98.6 g/kg | ATE (oral) = 984.00 mg/kg |
| Specified substance: SODIUM SILICATE | LD50 (oral, rat) = 1153.00 mg/kg | ATE (oral) = 1153.00 mg/kg |
| Specified substance: NICKEL | LD50 (oral, rat) > 9000 mg/kg | LD50 (dermal, rat) > 2000 mg/kg |
| Specified substance: FLUORIDES (as F) | LD50 (oral, rat) > 4250 mg/kg |

Repeated dose toxicity (product): Not classified

Skin corrosion/irritation (product): Not classified

Serious eye damage/irritation (product): Not classified

Respiratory or skin sensitization (product): May cause an allergic skin reaction

Germ cell mutagenicity (product): Not classified

Carcinogenicity (product): May cause cancer

Nickel (7440-02-0)

- International Agency for Research on Cancer (IARC) Monographs 2B (Possibly carcinogenic to humans)
- National Toxicology Program (NTP) Status Reasonably anticipated to be a Human Carcinogen

Reproductive toxicity (product): Not classified

Specific target organ toxicity - single exposure (product): Not classified

Specific target organ toxicity - repeated exposure (product): Causes damage to organs through prolonged or repeated exposure

Aspiration hazard (product): Not classified

Other Effects: Organic polymers may be used in the manufacture of various welding consumables. Overexposure to their decomposition byproducts may result in a condition known as polymer fume fever. Polymer fume fever usually occurs within 4 to 8 hours of exposure with the presentation of flu like symptoms, including mild pulmonary irritation with or without an increase in body temperature. Signs of exposure can include an increase in white blood cell count. Resolution of symptoms typically occurs quickly, usually not lasting longer than 48 hours.

Symptoms related to the physical, chemical and toxicological characteristics under the condition of use:

Specified substance: NICKEL

- Inhalation: Nickel and its compounds are on the IARC and NTP lists as posing respiratory cancer risk, and are skin sensitizers with symptoms ranging from slight itch to severe dermatitis.

Additional toxicological information under the conditions of use:

Acute toxicity

Specified substance: FLUORIDES (as F) LD50 (oral, rat) = 4,250 mg/kg

Specified substance: CARBON DIOXIDE LC50 (inhalation, human) = 90000 ppm/5 min.

Specified substance: CARBON MONOXIDE LC50 (inhalation, rat) = 1300 mg/l/4h

Specified substance: NITROGEN DIOXIDE LC50 (inhalation, rat) = 88 ppm/4h

Specified substance: OZONE LC50 (inhalation, human) = 50 ppm/30 min.

Carcinogenicity: The International Agency for Research on Cancer (IARC) has classified welding fumes as possibly carcinogenic to humans (group 2B).

Specified substance: Nickel

- International Agency for Research on Cancer (IARC) Monographs 2B (Possibly carcinogenic to humans)
- National Toxicology Program (NTP) Status Reasonably anticipated to be a Human Carcinogen
Section 12 – ECOLOGICAL INFORMATION

Eco-toxicity

Acute hazards to the aquatic environment:

<table>
<thead>
<tr>
<th>Specified substance: COPPER and compounds (as Cu)</th>
<th>Specified substance: NICKEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 (Fathead minnow (Pimephales promelas), 96 h): 1.6 mg/l</td>
<td>LC50 (Fathead minnow (Pimephales promelas), 96 h): 2.916 mg/l</td>
</tr>
<tr>
<td>LC50 (Fathead minnow (Pimephales promelas), 96 h): 0.0068 – 0.0156 mg/l</td>
<td>LC50 (Brachydanio rerio), 96 h): &gt;100 mg/l</td>
</tr>
<tr>
<td>LC50 (Fathead minnow (Pimephales promelas) [static], 96 h): &lt;0.3 mg/l</td>
<td>LC50 (Cyprinus carpio) [semi-static], 96 h): 1.3 mg/l</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified substance: IRON and/or iron alloys (as Fe)</th>
<th>Specified substance: CALCIUM CARBONATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 (Cynicus carpio) [semi-static], 96 h): 0.56 mg/l</td>
<td>LC50 (Rainbow trout (Oncorhynchus mykiss), 96 h): &gt;100/kg</td>
</tr>
</tbody>
</table>

Aquatic Invertebrates

<table>
<thead>
<tr>
<th>Specified substance: SODIUM SILICATE</th>
<th>Specified substance: COPPER and compounds (as Cu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 (Western mosquitofish (Gambusia affinis), 96 h): 1,800 mg/l</td>
<td>EC50 (Water flea (Daphnia magna), 48 h): 0.102 mg/l</td>
</tr>
</tbody>
</table>

Chronic hazards to the aquatic environment:

<table>
<thead>
<tr>
<th>Specified substance: SODIUM SILICATE</th>
<th>Specified substance: COPPER and compounds (as Cu) - LC50 (Green algae (Scenedesmus dimorphus), 3 d): 0.0623 mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC50 (Water flea (Ceriodaphnia dubia), 48 h): 22.94 – 49.01 mg/l</td>
<td>EC50 (Water flea (Daphnia magna), 48 h): 0.102 mg/l</td>
</tr>
</tbody>
</table>

Biodegradation (product): No data available

Bioaccumulative Potential

| Specified substance: COPPER and compounds (as Cu) - Blue-green algae (Anacystis nidulans), Bioconcentration Factor (BCF): 36.01 (Static) | Specified substance: NICKEL - Zebra mussel (Dreissena polymorpha), Bioconcentration Factor (BCF): 5,000 - 10,000 (Lotic) Bioconcentration factor calculated using dry weight tissue conc |

Mobility in Soil: No data available

Other Adverse Effects: Very toxic to aquatic organisms

Section 13 – DISPOSAL CONSIDERATIONS

Waste disposal recommendations: Prevent waste from contaminating surrounding environment. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with international/federal/state/local regulations. However, alloy wastes are normally collected to recover metal values.

Section 14 – TRANSPORT INFORMATION

In accordance with DOT / ADR / RID / ADNR / IMDG / ICAO / IATA

14.1 UN number

Not a dangerous good in sense of transport regulations

14.2 UN proper shipping name

Not applicable
Section 15 – REGULATORY INFORMATION

15.1 US Federal regulations

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings)</th>
<th>SARA Section 313 - Emission Reporting:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel (7440-02-0)</td>
<td>Copper (7440-50-8)</td>
<td>0.1%</td>
</tr>
<tr>
<td>Iron (7439-88-6)</td>
<td>Sodium silicate (1344-09-8)</td>
<td>1.0%</td>
</tr>
<tr>
<td>Calcium carbonate (1317-65-3)</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td></td>
</tr>
<tr>
<td>Tin (7440-31-5)</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td></td>
</tr>
</tbody>
</table>

15.2 US State regulations

WARNING: This product contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health and Safety Code Section 25249.5 et seq.)

<table>
<thead>
<tr>
<th>Chemical</th>
<th>U.S. - California - Proposition 65 - Carcinogens List</th>
<th>U.S. - California - Proposition 65 - Developmental Toxicity</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Female</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</th>
<th>No significance risk level (NSRL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel (7440-02-0)</td>
<td>Yes</td>
<td>U.S. - New Jersey - Right To Know List</td>
<td>U.S. - New Jersey - Right to Know Hazardous Substance List</td>
<td>U.S. - New Jersey - Right to Know List</td>
<td></td>
</tr>
<tr>
<td>Copper (7440-50-8)</td>
<td>Fluorides (as F) (16984-48-8)</td>
<td>U.S. - Massachusetts - Right To Know List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td></td>
</tr>
<tr>
<td>Silicon (7440-21-3)</td>
<td>U.S. - Massachusetts - Right To Know List</td>
<td>U.S. - Massachusetts - Right to Know Hazardous Substance List</td>
<td>U.S. - New Jersey - Right to Know Hazardous Substance List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td></td>
</tr>
<tr>
<td>Potassium (7440-09-7)</td>
<td>U.S. - New Jersey Worker and Community Right-to-Know Act</td>
<td>U.S. - Massachusetts - Right To Know List</td>
<td>U.S. - Minnesota - Hazardous Substance List</td>
<td>U.S. - New Jersey - Right to Know Hazardous Substance List</td>
<td></td>
</tr>
<tr>
<td>Calcium carbonate (1317-65-3)</td>
<td>U.S. - Massachusetts - Right To Know List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 16 – OTHER INFORMATION

SUPERSEDES LAST REVISION: 12/23/2015 (SDS)

<table>
<thead>
<tr>
<th>HMIS RATING (Hazardous Materials Information System)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health (blue) - 2</td>
</tr>
<tr>
<td>Flammability (red) - 0</td>
</tr>
<tr>
<td>Reactivity (yellow) - 0</td>
</tr>
<tr>
<td>Protective Equipment - X (See Sections 4, 8 &amp; 10)</td>
</tr>
</tbody>
</table>

Health Hazard: 2 (moderate acute or significant chronic exposure hazard)
Flammability Hazard: 0 (minimal hazard)
Reactivity Hazard: 0 (normally stable)
CROWN ALLOYS COMPANY

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 on short exposure cause serious temporary or residual injury); 4 (materials that under very short exposure causes death or major residual injury).
Flammability Hazard: Refer to definitions for "HMIS RATING (Hazardous Materials Information System)"
Reactivity Hazard: Refer to definitions for "HMIS RATING (Hazardous Materials Information System)"

DEFINITIONS OF TERMS
ACGIH - American Conference of Governmental Industrial Hygienists
CAS No. - Chemical Abstracts Service Number
EPA - Environmental Protection Agency
GHS - Globally Harmonized System
IARC - International Agency for Research on Cancer
LC50 - Lethal Concentration (50 percent kill)
LCLO - Lowest published lethal concentration
LD50 - Lethal dose (50 percent kill)
LDL0 - Lowest published lethal dose
NIOSH - National Institute of Occupational Safety and Health

Full text of S-phrases (from Section 3)
S1/2 – Keep locked up and out of the reach of children.
S2 – Keep out of the reach of children.
S2/22 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
S23 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
S25 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
S36/37/38 – Wear suitable protective clothing, gloves and eye/face protection.
S37 – Wear suitable gloves.
S39 – In case of accidental release, inform responsible authorities.
S40 – Do not breathe dust.
S41 – In case of accidental release, take off and wash skin after removing contaminated clothing.
S42 – Do not get in eyes.
S43 – Do not get on skin.
S44 – In case of accidental release, take off and wash skin after removing contaminated clothing.
S45 – In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S46 – In case of accidental release, take off and wash skin after removing contaminated clothing.
S50 – In case of accident, take off contaminated clothing and wash before reuse.
S51 – In case of accidental release, take off contaminated clothing and wash before reuse.
S55 – In case of accidental release, take off contaminated clothing and wash before reuse.
S56 – In case of accidental release, take off contaminated clothing and wash before reuse.
S60/2 – Avoid release to the environment. Refer to special instructions / Safety data sheet.
S61 – Avoid release to the environment. Refer to special instructions / Safety data sheet.
S62 – Avoid release to the environment. Refer to special instructions / Safety data sheet.
S63 – Avoid release to the environment. Refer to special instructions / Safety data sheet.
S64 – Avoid release to the environment. Refer to special instructions / Safety data sheet.
S65 – Avoid release to the environment. Refer to special instructions / Safety data sheet.

Full text of R-phrases (from Section 2 & 3)
R2 – Keep out of the reach of children.
R20/22 – Harmful by inhalation and if swallowed.
R21/20 – Harmful by inhalation and if swallowed.
R22 – Do not breathe dust.
R23 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
R34 – Causes skin irritation.
R35 – Causes severe eye irritation.
R36 – Causes drowsiness or dizziness.
R37 – Causes damage to organs through prolonged or repeated exposure.
R38 – Causes damage to organs through prolonged or repeated exposure.
R40 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
R41 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
R42 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
R44 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
R45/20/23/28 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
R51/53 – Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R66 – Harmful to aquatic life with long lasting effects.

Full text of H-phrases (from Section 2 & 3)
H1 – Highly flammable.
H2 – Flammable.
H3 – Combustible.
H4 – Flammable gas.
H5 – Flammable liquids.
H6 – Flammable solids.
H7 – Flammable aqueous solutions.
H8 – Flammable dusts.
H9 – Flammable fibres.
H10 – Acute toxic by ingestion.
H11 – Acute toxic by inhalation.
H12 – Acute toxic by skin contact.
H13 – Toxic to aquatic life with acute effects.
H14 – Toxic to aquatic life with long lasting effects.
H15 – Harmful to aquatic life with acute effects.
H16 – Harmful to aquatic life with long lasting effects.
H17 – Very toxic to aquatic life with acute effects.
H18 – Very toxic to aquatic life with long lasting effects.
H20 – Very toxic to aquatic life with long lasting effects.
H21 – Very toxic to aquatic life with acute effects.
H22 – Very toxic to aquatic life with acute effects.
H23 – Very toxic to aquatic life with acute effects.
H24 – Very toxic to aquatic life with acute effects.
H25 – Very toxic to aquatic life with acute effects.
H26 – Very toxic to aquatic life with acute effects.
H27 – Very toxic to aquatic life with acute effects.
H28 – Very toxic to aquatic life with acute effects.
H29 – Very toxic to aquatic life with acute effects.
H30 – Rapidly degradable in the environment.
H31 – Slowly degradable in the environment.
H32 – Not degradable in the environment.
H33 – Not degradable in the environment.
H34 – Not degradable in the environment.
H35 – Not degradable in the environment.
H36 – Not degradable in the environment.
H37 – Not degradable in the environment.
H38 – Not degradable in the environment.
H39 – Not degradable in the environment.
H40 – Not degradable in the environment.
H41 – Not degradable in the environment.
H42 – Not degradable in the environment.
H43 – Not degradable in the environment.
H44 – Not degradable in the environment.
H45 – Not degradable in the environment.
H46 – Not degradable in the environment.
H47 – Not degradable in the environment.
H48 – Not degradable in the environment.
H49 – Not degradable in the environment.
H51 – Not degradable in the environment.
H52 – Not degradable in the environment.
H53 – Not degradable in the environment.
H54 – Not degradable in the environment.
H55 – Not degradable in the environment.
H56 – Not degradable in the environment.
H57 – Not degradable in the environment.
H58 – Not degradable in the environment.
H59 – Not degradable in the environment.
H60 – Not degradable in the environment.
H61 – Not degradable in the environment.
H62 – Not degradable in the environment.
H63 – Not degradable in the environment.
H64 – Not degradable in the environment.
H65 – Not degradable in the environment.
H66 – Not degradable in the environment.
H67 – Not degradable in the environment.
H68 – Not degradable in the environment.
H69 – Not degradable in the environment.
H70 – Not degradable in the environment.
H71 – Not degradable in the environment.
H72 – Not degradable in the environment.
H73 – Not degradable in the environment.
H74 – Not degradable in the environment.
H75 – Not degradable in the environment.
H76 – Not degradable in the environment.
H77 – Not degradable in the environment.
H78 – Not degradable in the environment.
H79 – Not degradable in the environment.
H80 – Not degradable in the environment.
H81 – Not degradable in the environment.
H82 – Not degradable in the environment.
H83 – Not degradable in the environment.
H84 – Not degradable in the environment.
H85 – Not degradable in the environment.
H86 – Not degradable in the environment.
H87 – Not degradable in the environment.
H88 – Not degradable in the environment.
H89 – Not degradable in the environment.
H90 – Not degradable in the environment.
H91 – Not degradable in the environment.
H92 – Not degradable in the environment.
H93 – Not degradable in the environment.
H94 – Not degradable in the environment.
H95 – Not degradable in the environment.
H96 – Not degradable in the environment.
H97 – Not degradable in the environment.
H98 – Not degradable in the environment.
H99 – Not degradable in the environment.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES: Crown Alloys Company urges each end user and recipient of this SDS to study it carefully. If necessary, consult an industrial hygienist or other expert to understand this information and safeguard the environment and protect workers from the potential hazards associated with the handling or use of this product. The information in this document is believed to be correct as of the date issued. However, this information is provided without any representation or warranty, expressed or implied, regarding 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 of loss, damage, or expense arising from it or any way connected with the handling, storage, use, or disposal of this product. Data may be changed from time to time. Be sure to consult the latest edition of the SDS. Compliance with all applicable Federal, State, Provincial and local laws and regulations remain the responsibility of the user.