

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Copper Tungsten , Copper Molybdenum, Copper Molybdenum Copper

24-HR. EMERGENCY ASSISTANCE

Transportation Emergency

Domestic: (858) 558-6666 Torrey Hills Technologies, LLC
International: (858) 558-6666 Torrey Hills Technologies, LLC

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL COMPOSITION (Percent by Weight)

CONSTITUENTS	CAS Numbers	Copper Tungsten	Copper Molybdenum	Copper Molybdenum Copper
Tungsten	7440-33-7	80 - 90		
Molybdenum	7439-98-7		80-90	80-90
Copper	7440-50-8	10 - 20	10 - 20	10 - 20
Nickel	7440-02-0	0 - 2	0 - 2	0 - 2
Cobalt	7440-48-4	0 - 0.6	0 - 0.6	0 - 0.6

Hazard Communication regulations of the U.S. Occupational Safety and Health Administration apply to this product.

NOTE: As used in this Material Safety Data Sheet, the term “particulate” refers to dust, mist, fume, fragments, particles and/or powder.

3. HAZARD IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Metallic product which poses little or no immediate hazard in solid form. See label in Section 16. If the material is involved in a fire; pressure-demand self-contained breathing apparatus and protective clothing must be worn by persons potentially exposed to the airborne particulate during or after a fire.

3.2 POTENTIAL HEALTH EFFECTS

Exposure to the elements listed in Section 2 by inhalation, ingestion, and skin contact can occur when melting, pickling, abrasive cutting, welding, grinding, sanding, polishing, milling, crushing, or otherwise abrading the surface of this material in a manner which generates particulate.

Exposure may also occur during repair or maintenance activities on contaminated equipment such as: furnace rebuilding, maintenance or repair of air cleaning equipment, structural renovation, etc.

Particulate depositing on hands, gloves, and clothing, can be transferred to the breathing zone and inhaled during normal hand to face motions such as rubbing of the nose or eyes, sneezing, coughing, etc.

3.2.1 3.2.2 Inhalation

Particulate containing those elements listed in Section 2 can cause irritation to the nose, throat, lungs, and mucous membranes. Inhalation of this particulate may cause metal fume fever (high temperature, metallic taste, nausea, coughing, general weakness, muscle aches, and exhaustion), bronchitis, chills, decreased pulmonary function, and asthma-like symptoms.

Cobalt: May cause asthmatic attacks due to allergic sensitization of the respiratory tract. May cause asthma and shortness of breath.

Copper: Inhalation of particulate containing metallic copper can cause ulceration and perforation of the nasal septum.

Nickel: Can cause headaches, dizziness, and difficult breathing. Inhalation of nickel and nickel compounds is associated with nasal and lung damage and cancer. Symptoms may include coughing, sore throat, and shortness of breath.

Ingestion

Ingestion can occur from hand, clothing, food and drink contact with particulate during hand to mouth activities such as eating, drinking, smoking, nail biting, etc.

Cobalt: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause allergic reaction.

Copper: Copper ingestion causes nausea, vomiting, abdominal pain, metallic taste, and diarrhea. Ingestion of large doses may cause stomach and intestine ulceration, jaundice, and kidney and liver damage.

Nickel: Causes gastrointestinal irritation with nausea, vomiting and diarrhea.

Tungsten: May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Molybdenum: May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Skin

Skin contact with this material may cause, in some sensitive individuals, an allergic dermal response. Skin contact may cause irritation. Symptoms include redness, itching and pain.

Cobalt: Prolonged and/or repeated contact may cause dermatitis.

Copper: Particulate may cause a greenish-black skin discoloration.

Nickel: May cause allergic dermatitis. Nickel is a contact allergen and sensitizer.

Eyes

Exposure may result from direct contact with airborne particulate or contact to the eye with contaminated hands or clothing. Damage can result from irritation or mechanical injury to the eyes by particulate.

Copper: Particulate in the eyes may cause discoloration.

Chronic (long-term health effects)

Cobalt: Repeated exposure may cause allergic respiratory reaction (asthma). Chronic inhalation of particulate may lead to restricted pulmonary function and lung fibrosis (scarring). Chronic ingestion may result in heart damage and/or failure, vomiting, convulsions and thyroid enlargement. Repeated exposure may cause sensitization dermatitis.

Copper: Prolonged or repeated exposure to copper can discolor skin and hair and irritate the skin; may cause mild dermatitis, runny nose, and irritation of the mucous membranes. Repeated ingestion may damage the liver and kidneys. Repeated Inhalation can cause chronic respiratory disease.

Nickel: Prolonged exposure to excessive concentrations of particulate may cause chronic pulmonary disorders. Nickel and certain nickel compounds are considered carcinogenic and noted for producing nasal and lung cancer. Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration.

Carcinogenic References

Cobalt: The International Agency for Research on Cancer (IARC) lists cobalt as a Group 2B – Possibly Carcinogenic to Humans. ACGIH lists elemental cobalt as an A3 – Animal Carcinogen. OSHA lists cobalt as a possible select carcinogen.

Nickel: The International Agency for Research on Cancer (IARC) lists nickel as a Group 2B – Possibly Carcinogenic to Humans. The National Toxicology Program (NTP) lists nickel as reasonably anticipated to be a human carcinogen. The ACGIH lists elemental nickel as an A5 – Not Suspected as a Human Carcinogen and insoluble nickel compounds as an A1 – Confirmed Human Carcinogen.

Medical Conditions Aggravated by Exposure

Persons with impaired pulmonary function, airway diseases, or conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further impairment if particulate is inhaled. If prior damage or disease to the neurologic (nervous), circulatory, hematologic (blood), or urinary (kidney) systems has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk where handling and use of this material may cause exposure.

Copper: Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function or pre-existing Wilson's disease may be more susceptible to the effects of this material.

Nickel: Skin contact with some nickel compounds in sensitive individuals may cause dermatitis (nickel itch).

3.3 POTENTIAL ENVIRONMENTAL EFFECTS

See Ecological Information (Section 12)

4. FIRST AID MEASURES

4.1 FIRST AID PROCEDURES

INHALATION: Breathing difficulty caused by inhalation of particulate requires immediate removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical help.

INGESTION: Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

SKIN: Thoroughly wash skin cuts or wounds to remove all particulate debris from the wound. Seek medical attention for wounds that cannot be thoroughly cleansed. Treat skin cuts and wounds with standard first aid practices such as cleansing, disinfecting and covering to prevent wound infection and contamination before continuing work. Obtain medical help for persistent irritation. Material accidentally implanted or lodged under the skin must be removed.

EYES: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. FIRE FIGHTING MEASURES

Flash Point	Non-combustible as a solid.
Explosive Limits	Not applicable to solids.
Extinguishing Media	This material is non-combustible. Use extinguishing media appropriate to the surrounding fire.
Unusual Fire and Explosion Hazards	Do not use water to extinguish fires around operations involving molten metal due to the potential for steam explosions.
Special Fire Fighting Procedures	If this material becomes airborne as a respirable particulate during a fire situation, pressure-demand self-contained breathing apparatus must be worn by firefighters or any other persons potentially exposed to the metal fumes.

6. ACCIDENTAL RELEASE MEASURES

6.1 STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

If this material is a particulate, establish a restricted entry zone based on the severity of the spill. Persons entering the restricted zone must wear adequate respiratory protection and protective clothing appropriate for the severity of the spill (see Section 8). Cleanup spills with a vacuum system utilizing a high efficiency particulate air (HEPA) filtration system followed by wet cleaning methods. Special precautions must be taken when changing filters on HEPA vacuum cleaners used to clean up hazardous materials. Be careful to minimize airborne generation of particulate and avoid contamination of air and water. Depending upon the quantity of material released into the environment, the incident may be required to be reported to the National Response Center at (800) 424-8802 as well as the State Emergency Response Commission and Local Emergency Planning Committee.

7. HANDLING AND STORAGE

7.1 HANDLING

Particulate may enter the body through cuts, abrasions or other wounds on the surface of the skin. Wear gloves when handling parts with loose surface particulate or sharp edges.

7.2 STORAGE

Store in a dry area.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

8.1 8.2 8.3 8.4 VENTILATION AND ENGINEERING CONTROLS

Whenever possible, the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne particulate. Where utilized, exhaust inlets to the ventilation system must be positioned as close as possible to the source of airborne generation. Avoid disruption of the airflow in the area of a local exhaust inlet by equipment such as a man-cooling fan. Check ventilation equipment regularly to ensure it is functioning properly. Provide training on the use and operation of ventilation to all users. Use qualified professionals to design and install ventilation systems.

WORK PRACTICES

Develop work practices and procedures that prevent particulate from coming in contact with worker skin, hair, or personal clothing. If work practices and/or procedures are ineffective in controlling airborne exposure or visual particulate from deposition on skin, hair, or clothing, provide appropriate cleaning/washing facilities. Procedures should be written that clearly communicate the facility's requirements for protective clothing and personal hygiene. These clothing and personal hygiene requirements help keep particulate from being spread to non-production areas or from being taken home by the worker. Never use compressed air to clean work clothing or other surfaces.

Fabrication processes may leave a residue of particulate on the surface of parts, products or equipment that could result in employee exposure during subsequent material handling activities. As necessary, clean loose particulate from parts between processing steps. As a standard hygiene practice, wash hands before eating or smoking.

To prevent exposure, remove surface scale or oxidation formed on cast or heat treated products in an adequately ventilated process prior to working the surface.

WET METHODS

Machining operations are usually performed under a liquid lubricant/coolant flood which assists in reducing airborne particulate. However, the cycling through of machine coolant containing finely divided particulate in suspension can result in the concentration building to a point where the particulate may become airborne during use. Certain processes such as sanding and grinding may require complete hooded containment and local exhaust ventilation. Prevent coolant from splashing onto floor areas, external structures or operators' clothing. Utilize a coolant filtering system to remove particulate from the coolant.

RESPIRATORY PROTECTION

When airborne exposures exceed or have the potential to exceed the occupational limits shown in Section 8.13, approved respirators must be used as specified by an Industrial Hygienist or other qualified professional. Respirator users must be medically evaluated to determine if they are physically capable of wearing a respirator. Quantitative and/or qualitative fit testing and respirator training must be satisfactorily completed by all personnel prior to respirator use. Users of tight fitting respirators must be clean shaven on those areas of the face where the respirator seal contacts the face. Exposure to unknown concentrations of particulate requires the wearing of a pressure-demand airline respirator or pressure-demand self-contained breathing apparatus (SCBA). Use pressure-demand airline respirators when performing jobs with high potential exposures such as changing filters in a baghouse air cleaning device.

8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 OTHER PROTECTIVE EQUIPMENT

Protective overgarments or work clothing must be worn by persons who may become contaminated with particulate during activities such as machining, furnace rebuilding, air cleaning equipment filter changes, maintenance, furnace tending, etc. Contaminated work clothing and overgarments must be managed in a controlled manner to prevent secondary exposure to workers of third parties, to prevent the spread of particulate to other areas, and to prevent particulate from being taken home by workers.

PROTECTIVE GLOVES

Wear gloves to prevent contact with particulate or solutions. Wear gloves to prevent metal cuts and skin abrasions during handling.

EYE PROTECTION

Wear safety glasses, goggles, face shield, or welder's helmet when risk of eye injury is present, particularly during melting, casting, machining, grinding, welding, powder handling, etc.

HOUSEKEEPING

Use vacuum and wet cleaning methods for particulate removal from surfaces. Be certain to de-energize electrical systems, as necessary, before beginning wet cleaning. Use vacuum cleaners with high efficiency particulate air (HEPA). Do not use compressed air, brooms, or conventional vacuum cleaners to remove particulate from surfaces as this activity can result in elevated exposures to airborne particulate. Follow the manufacturer's instructions when performing maintenance on HEPA filtered vacuums used to clean hazardous materials.

MAINTENANCE

During repair or maintenance activities the potential exists for exposures to particulate in excess of the occupational standards. Under these circumstances, protecting workers can require the use of specific work practices or procedures involving the combined use of ventilation, wet and vacuum cleaning methods, respiratory protection, decontamination, special protective clothing, and when necessary, restricted work zones.

WELDING

Local exhaust or general ventilating systems must be provided and arranged to keep the amount of toxic fumes, gases, or dusts below the maximum allowable concentration for the constituents listed in Section 2.

EXPOSURE CHARACTERIZATION

Determine exposure to airborne particulate by air sampling in the employee breathing zone, work area, and department. Utilize an Industrial Hygienist or other qualified professional to specify the frequency and type of air sampling. Develop and utilize a sampling strategy which identifies the extent of exposure variation and provides statistical confidence in the results. Conduct an exposure risk assessment of processes to determine if conditions or situations exist which dictate the need for additional controls or improved work practices. Make air sample results available to employees.

MEDICAL SURVEILLANCE

OCCUPATIONAL EXPOSURE LIMITS

CONSTITUENTS	OSHA*		ACGIH*			NIOSH RTECS NUMBER
	PEL	CEILING	PEAK	TLV	TLV-STEL	
Cobalt	0.1	N/A	N/A	0.02	N/A	GF8750000
Copper Dust & Mist	1	N/A	N/A	1	N/A	GL5325000
Copper Fume	0.1	N/A	N/A	0.2	N/A	GL5325000
Nickel	1	N/A	N/A	1.5	N/A	QR5950000
Tungsten	N/A	N/A	N/A	5	10	YO7175000
Molybdenum	N/A	N/A	N/A	5	10	

*ALL CONCENTRATIONS ARE IN MILLIGRAMS PER CUBIC METER OF AIR
(at the concentrations noted above, these constituents may not be visible to the human eye)

A leading scientific body recommending occupational standards is the American Conference of Governmental Industrial Hygienists (ACGIH). The ACGIH recommends standards for all listed substances. The ACGIH defines a threshold limit value (standard) as follows: "Threshold Limit Values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. Because of wide variation in individual susceptibility, however, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit; a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness." "Individuals may also be hypersusceptible or otherwise unusually responsive to some industrial chemicals because of genetic factors, age, personal habits (smoking, alcohol, or other drugs), medication, or previous exposures. Such workers may not be adequately protected from adverse health effects from certain chemicals at concentrations at or below the threshold limits."

ACGIH = American Conference of Governmental Industrial Hygienists

OSHA = Occupational Safety and Health Administration

PEL = Eight-Hour Average Permissible Exposure Limit (OSHA)

CEILING = Not To Be Exceeded Except For Peak Limit (OSHA)

PEAK = 30-Minute Maximum Duration Concentration Above Ceiling Limit (OSHA)

TLV = Eight-Hour Average Threshold Limit Value (ACGIH)

TLV-STEL = 15-Minute Short Term Exposure Limit (ACGIH)

CAS = Chemical Abstract Service

NIOSH = National Institute For Occupational Safety and Health

RTECS = Registry of Toxic Effects of Chemical Substances

NA = Not Applicable

We recommend following good industrial hygiene practice which includes reducing airborne exposures to the lowest feasible level for all constituents in this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Boiling Point:	Not Applicable	Radioactivity:	Not Applicable
Evaporation Rate:	Not Applicable	Solubility:	Insoluble
Freezing Point:	Not Applicable	Sublimes At	Not Applicable
Odor:	None	Vapor Density (Air = 1):	Not Applicable
pH:	Not Applicable	Vapor Pressure (mmHg):	Not Applicable
Physical State:	Solid	% Volatiles By Volume:	Not Applicable
Color:	Gray	Melting Point (°F):	3430
Density (lb/in3):			.623

10. STABILITY AND REACTIVITY



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General Reactivity This material is stable
Incompatibility (materials to avoid) Not Applicable

Hazardous Decomposition Products None under normal conditions of use.

Hazardous Polymerization Will Not Occur

This material can be recycled; contact your Sales Representative.

11. ECOLOGICAL INFORMATION

12. DISPOSAL CONSIDERATIONS

13.1 13.2 BYPRODUCT RECYCLING

When recycled (used in a process to recover metals), this material is not classified as hazardous waste under federal law. Seal particulate or particulate containing materials inside two plastic bags, place in a DOT approved container, and label appropriately.

SOLID WASTE MANAGEMENT

When recycled (used in a process to recover metals), this material is not classified as hazardous waste under federal law. When spent products are declared solid wastes (no longer recyclable), they must be labeled, managed and disposed of, in accordance with federal, state and local requirements.

13. TRANSPORT INFORMATION

There are no U.S. Department of Transportation hazardous material regulations which apply to the packaging and labeling of this product as shipped by Torrey Hills.

Hazard Communication regulations of the U.S. Occupational Safety and Health Administration require this product be labeled.

14. REGULATORY INFORMATION

14.1. UNITED STATES FEDERAL REGULATIONS

14.1.1 Occupational Safety and Health Administration (OSHA)

Air contaminants, 29 CFR 1910.1000

Hazard Communication Standard, 29 CFR 1910.1200

14.1.2 Environmental Protection Agency (EPA)

AMBIENT AIR EMISSIONS: Most process air emission sources will require an air permit from a local and/or state air pollution control agency. The use of air cleaning equipment may be necessary to achieve the permissible emission. Tempered makeup air should be provided to prevent excessive negative pressure in a building. Direct recycling of cleaned process exhaust air is not recommended. Plant exhausts should be located so as not to re-enter the plant through makeup air or other inlets. Regular maintenance and inspection of air cleaning equipment and monitoring of operating parameters is recommended to ensure adequate efficiency is maintained.

WASTEWATER: Wastewater regulations can vary considerably. Contact your local and state governments to determine their requirements.

TOXIC SUBSTANCES CONTROL ACT: Component(s) of this material is/are listed on the TSCA Chemical Substance Inventory of Existing Chemical Substances

SARA TITLE III REPORTING REQUIREMENTS: On February 16, 1988 the U.S. Environmental Protection Agency (EPA) issued a final rule that implements the requirements of the Superfund Amendments and Reauthorization Act (SARA) Title III, Section 313 (53) Federal Register 4525. Title III is the portion of SARA concerning emergency planning and community right-to-know issues. Section 313 covers annual emission reporting on specific chemicals which are manufactured, processed or used at certain U.S. Industrial facilities.

Torrey Hills products are reportable under the Section 313 category of Compounds and/or Mixtures. These mixtures contain one or more of the following reportable constituents: Cobalt, Copper, and Nickel. The specific chemical makeup, concentration by weight and the Chemical Abstracts Services number for each of our products is provided in Section 2.

You may obtain additional information by calling the EPA SARA Title III Hotline at 1-800-535-0202 (or 703 412 9810).

15.2 STATE REGULATIONS

Cobalt



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- Is listed on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

- The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act
WARNING: This product contains COBALT, a chemical known to the state of California to cause cancer.

- California No Significant Risk Level: Not listed.

Copper

- Is listed on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts. California No Significant Risk Level: Not listed.

Nickel

- Is listed on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

- The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act -
WARNING: This product contains NICKEL, a chemical known to the state of California to cause cancer.

- California No Significant Risk Level: Not listed.

Tungsten

- Is listed on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

- California No Significant Risk Level: Not listed.

Molybdenum

- Is listed on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

- California No Significant Risk Level: Not listed.

14.3 CANADA

Constituent	DSL/NDSL	WHMIS Classification	Ingredient Disclosure List
Cobalt	Yes/No	D2A,D2B	Yes
Copper	Yes/No	D2B	Yes
Nickel	Yes/No	D2A	Yes
Tungsten	Yes/No	B4, D2A	Yes
Tungsten	Yes/No	B4, D2A	Yes