TED PELLA, INC.
Microscopy Products for Science and Industry

Safety Data Sheet
Product No. 1655, 1655-B, 1656, Beryllium
Beryllium Products
Issue Date (03-21-14)
Review Date (04-10-15)

Section 1: Product and Company Identification
Product Name: Beryllium Products
Synonym: Be, Glucinium
Company Name
Ted Pella, Inc., P.O. Box 492477, Redding, CA 96049-2477
Domestic Phone (800) 237-3526 (Mon-Thu. 6:00AM to 4:30PM PST; Fri 6:00AM to 4:00PM PST)
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Chemtrec Emergency Number 1-800-424-9300 24 hrs a day.

Section 2: Hazard Identification

GHS Pictograms: None if used in solid form.

GHS Categories: None if used in solid form.

Signal Word: NA

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.

Health Effects:
NFPA Hazard Rating: Health: 2; Fire: 0; Reactivity: 0
HMIS® Hazard Rating: Health: 2; Fire: 0; Reactivity: 0
(0=least, 1=Slight, 2=Moderate, 3=High, 4=Extreme)

Results of PBT and vPvB assessment: A chemical safety assessment has not been carried out.
PBT: ND
vPvB: ND

Emergency overview:
Appearance: Metallic solid
Immediate effects: ND
Potential health effects

Beryllium metal, in solid form and as contained in finished products presents no special health risks. Exposure to the elements listed by inhalation, ingestion, and skin contact can occur when melting, casting, dross handling, pickling, chemical cleaning, heat treating, abrasive cutting, welding, grinding, sanding, polishing, milling, crushing, or otherwise heating or 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, welding, 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.
Primary Routes of entry: Inhalation, eye and skin contact.
Signs and Symptoms of Overexposure:
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.
Skin: Beryllium: Particulate that becomes lodged under the skin has the potential to induce sensitization and skin lesions.
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. Beryllium: The health effect of ingestion of beryllium in the form found in this product is unknown.
Inhalation: Can cause irritation to the nose, throat, lungs and mucous membranes.
Beryllium: The beryllium in this product is not known to cause acute health effects. Inhaling particulate containing beryllium may cause a serious, chronic lung disease called Chronic Beryllium Disease (CBD) in some individuals.
Chronic Exposure: Beryllium: Inhaling particulate containing beryllium may cause a serious, chronic lung disease called chronic beryllium disease (CBD) in some individuals. Over time, lung disease can be fatal. Chronic beryllium disease is a hypersensitivity or allergic condition in which the tissues of the lungs become inflamed. This inflammation, sometimes with accompanying fibrosis (scarring), may restrict the exchange of oxygen between the lungs and the bloodstream. Medical science suggests that CBD may be related to genetic factors.
Chemical Listed As Carcinogen Or Potential Carcinogen: Beryllium: The International Agency for Research on Cancer (IARC) lists beryllium as a Group 1 – Known Human Carcinogen. The National Toxicology Program (NTP) lists beryllium as known to be human carcinogens. IARC lists beryllium as a known human carcinogen (Group 1) and notes that the work environment of workers involved in refining, machining and producing beryllium metal was associated with an increased risk of lung cancer, “the greater excess was in workers hired before 1950 when exposures to beryllium in the work place were relatively uncontrolled and much higher than in subsequent decades”; and “the highest risk for lung cancer being observed among individuals diagnosed with acute beryllium-induced pneumonitis, who represent a group that had the most intense exposure to beryllium.” IARC further noted that “Prior to 1950, exposure to beryllium in working environments was usually very high, and concentrations exceeding 1 mg/m3 [1000 micrograms per cubic meter] were not unusual.”
See Toxicological Information (Section11)

Potential environmental effects
See Ecological Information (Section 12)

Section 3: Composition / Information on Ingredients

Principle Hazardous Component(s) (chemical and common name(s)) (Cas. No)	%	OSHA PEL mg/m3	ACGIH TLV mg/m3	NTP Carcinogen	IARC Carcinogen	OSHA regulated Carcinogen
Beryllium (7440-41-7) EC-No: 231-150-7	~100	PEL 0.002 CEILING 0.005 PEAK 0.025	TLV 0.00005 TLV-STEL NA	Known	Group 1	Known

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Section 4: First Aid Measures
If accidental overexposure is suspected
Eye(s) Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.
Skin Contact: 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.
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.
Note to physician
Treatment: Treatment of Chronic Beryllium Disease: There is no known treatment which will cure chronic beryllium disease. Prednisone or other corticosteroids are the most specific treatment currently available. They are directed at suppressing the immunological reaction and can be effective in diminishing signs and symptoms of chronic beryllium disease. In cases where steroid therapy has had only partial or minimal effectiveness, other immunosuppressive agents, such as cyclophosphamide, cyclosporine, or methotrexate, have been used. These latter agents remain investigational. Further, in view of the potential side effects of all the immunosuppressive medications, including steroids such as prednisone, they should be used only under the direct care of a physician. In general, these medications should be reserved for cases with significant symptoms and/or significant loss of lung function. Other symptomatic treatment, such as oxygen, inhaled steroids or bronchodilators, may be prescribed by some physicians and can be effective in selected cases. The decision about when and with what medication to treat is a judgment situation for individual physicians. For the most part, treatment is reserved for those persons with symptoms and measurable loss of lung function. The value of starting

oral steroid treatment, before signs or symptoms are evident, remains a medically unresolved issue. The effects of continued low exposure to beryllium are unknown for individuals who are sensitized to beryllium or who have a diagnosis of chronic beryllium disease. It is generally recommended that persons who are sensitized to beryllium or who have CBD terminate their occupational exposure to beryllium.
Medical Conditions generally 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. Beryllium: The effects of chronic beryllium disease on the lungs and heart are additive to the effects of other health conditions.

Section 5: Fire Fighting Measures
Flash Point: Not applicable to solids.
Flammable Limits: Not applicable to solids.
Auto-ignition point: Not applicable to solids.
Fire Extinguishing Media: Only in powder or other finely divided form does this material present a special fire problem. To extinguish a metal powder fire, use Class D fire extinguishing powder.
Special Fire Fighting Procedures: Pressure-demand self-contained breathing apparatus must be worn by firefighters or any other persons potentially exposed to the particulate released during or after a 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. In addition, water may disassociate when in contact with burning metal particulate or chips releasing flammable hydrogen gas which could burn and result in an explosion.
Ventilation duct work which has accumulated a fine coating of this material as a particulate on its internal surface poses a potentially serious fire hazard. Extinguish using Class D fire extinguisher media and shut down or isolate the affected portion of the ventilation system. Because of this potential risk, sources of ignition such as flame, spark from machining of other materials, welding spark, etc. must not be allowed to enter the ventilation duct work. Also, duct work must be made of non-combustible material. See Section 8 for further information regarding personal protective measures.
Hazardous combustion products: None
DOT Class: Not regulated

Section 6: Accidental Release Measures
Steps to be Taken in Case 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, as well as the State Emergency Response Commission and Local Emergency Planning Committee.
Waste Disposal Methods: Dispose of waste according to Federal, State and Local Regulations.

Section 7: Handling and Storage
Precautions to be taken in Handling and Storage: 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.
Storage temperature: Store in a dry area.
Storage Pressure: ND

Section 8: Exposure Controls / Personal Protection
Engineering Controls
Ventilation required: 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.
Personal Protection Equipment
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 conducted under a flood of liquid coolant require complete hooded containment and local exhaust ventilation. Openings into the hood must be baffled to prevent release of fast moving particulate. The cycling through a machine of liquid lubricant/coolant containing finely divided beryllium particulate in suspension can result in the concentration building to a point where the particulate may become airborne during use. 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 8.15, 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 bag house air cleaning device.

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.

Additional clothing and/or equipment:

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: In accordance with OSHA regulation 29 CFR 1910.252 welding of materials containing beryllium is regulated as follows: Welding or cutting indoors, outdoors, or in confined spaces involving beryllium containing base or filler metals shall be done using local exhaust ventilation and pressure-demand airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentrations defined by 29 CFR 1910.1000. In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators.

Corrosion Protection: Beryllium is corrosion-resistant in air and water up to 600°C. This is attributed to the formation of an adherent oxide layer on the surface.

The presence of salts in water, particularly chloride, dramatically accelerates the corrosion of beryllium. This corrosion can be further accelerated (galvanic corrosion) if beryllium is in contact with a less reactive metal. Contrarily, beryllium can be protected from corrosion by contact with a more reactive metal (anodic protection). Generally,

some corrosion protection should be applied to beryllium. Salts from handling beryllium without gloves along with humidity in the air are sufficient to cause “finger print” corrosion on a bare beryllium part. A chromate conversion coating is an effective protection for non-severe service. For applications where beryllium is exposed to salt spray or mist, an integral coating is needed to prevent corrosion. The conversion coating alone will not protect beryllium in salt spray applications. Conversion coating in combination with anodic protection with manganese or magnesium has been effective in protecting beryllium brake components on aircraft carrier based planes. Electroless nickel, epoxy paint and other integral coatings are effective corrosion barriers in salt spray applications.

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: Beryllium: Medical surveillance for beryllium health effects includes (1) skin examination, (2) respiratory history, (3) examination of the lungs, (4) lung function tests (FVC and FEV1), and (5) periodic chest x-ray. In addition, a specialized, specific, immunological blood test, the beryllium blood lymphocyte proliferation test (BLPT), is available to assist in the diagnosis of beryllium related reactions. Individuals who have an abnormal BLPT are normally referred to a lung specialist for additional specific tests to determine if chronic beryllium disease is present. Note: Substantial inter- and intra-laboratory disagreement exists among the laboratories that conduct this test. The BLPT does not at this time meet the criteria for a screening test. Despite its limitations, however, the BLPT remains a useful disease surveillance tool.

Risk Factors: Specific genetic factors have been identified and have been shown to increase an individual’s susceptibility to CBD. Medical testing is available to detect genetic factors in individuals.

Exposure Guidelines

See Composition/Information on Ingredients (Section 3)

Section 9 Physical and Chemical Properties

Appearance and Physical State: Gray metallic solid
Odor (threshold): NA
Specific Gravity (H_2O=1): 1.85 g/cc at 20°C
Vapor Pressure (mm Hg): NA
Vapor Density (air=1): NA
Percent Volatile by volume: None
Evaporation Rate (butyl acetate=1): NA
Boiling Point: 5378°F
Freezing point / melting point: 2345°F
pH: NA

Solubility in Water: Insoluble
Molecular Weight: 9.01

Section 10: Stability and Reactivity
Stability: Stable
Conditions to Avoid: ND
Materials to Avoid (Incompatibility): Avoid contact with mineral acids and strong bases which generate hydrogen gas. Hydrogen gas can be an explosion hazard.
Hazardous Decomposition Products: None under normal conditions of use.
Hazardous Polymerization: Will not occur

Section 11: Toxicological Information
Results of component toxicity test performed: ND
Human experience: Likely Routes of Exposure: Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.
Symptoms of Exposure: Dust may cause irritation to upper respiratory tract, skin or eyes.
Acute and Chronic Effects: Some people inhaling low concentrations of beryllium develop chronic beryllium disease, a granulomatous lung disease characterized by dyspnea, cough, reduced pulmonary function, and a variety of other symptoms including weight loss. The lack of a dose-response relationship between the extent of exposure and development of the disease, long latency period between exposure and onset, and the low incidence among beryllium exposed individuals suggests that the disease is immune mediated.
This product **does** contain Beryllium listed by NTP or IARC or regulated by OSHA as a carcinogen. Beryllium: The International Agency for Research on Cancer (IARC) lists beryllium as a Group 1 – Known Human Carcinogen.

Section 12: Ecological Information
Ecological Information: This material can be recycled.
Chemical Fate Information: ND

Section 13 Disposal Considerations
RCRA 40 CFR 261 Classification:
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. This material is not classified a hazardous waste under federal law.
The U.S. Environmental Protection Agency has classified beryllium powder (P015) as a hazardous waste under the Resource Conservation and Recovery Act (RCRA). In Section 40 CFR 261.33(e) of RCRA, beryllium powder is considered hazardous when it is in the form of a “discarded commercial chemical product, off-specification species, container residue and spill residue, thereof.” This designation only applies to commercially pure products or manufacturing intermediates in which beryllium is the “sole active ingredient.” Due to the limited scope of this definition, the only form of beryllium to which it applies is waste commercially pure metallic beryllium powder.

Beryllium scrap, chips, and powder are normally recycled as by-products and are not classified a waste. In cases where this is not justified, seal any off-specification metallic beryllium powder in two plastic bags and then place in a DOT container approved for flammable solids. If being disposed, the outer container must be labeled with the appropriate EPA hazardous waste label and DOT hazard warning label(s) and shipped under a uniform hazardous waste manifest to an approved hazardous waste management facility. Dispose of dust collector filters contaminated with metallic beryllium powder following the above procedure, with the exception of the hazardous waste manifest and hazardous waste container label. Federal, State and local laws governing disposal of materials can differ. Ensure proper disposal compliance with proper authorities before disposal.

Section 14: Transportation Information

Beryllium Solid Form:
US DOT Information: Proper shipping name: Not regulated
IATA: Proper shipping name: Not regulated
Marine Pollutant: No
Canadian TDG: Not regulated

Section 15: Regulatory Information

United States Federal Regulations

MSDS complies with OSHA's Hazard Communication Rule 29, CFR 1910.1200.
SARA: Substance is listed.
SARA Title III: Substance is listed.
RCRA: Beryllium powder is considered hazardous when it is in the form of a "discarded commercial chemical product, off-specification species, container residue and spill residue, thereof."
TSCA: All components are listed.
CERCLA: Beryllium Powder: RQ = 10 lb (4.54 Kg)

State Regulations

California Proposition 65: Warning! This product contains a chemical known to the state of California to cause cancer. Beryllium (7440-41-7)

International Regulations

Canada WHMIS: D2A, D2B
Europe EINECS Numbers: ND

Section 16: Other Information

Label Information:

Beryllium Solid
WARNING!

INHALING DUST OR FUMES MAY CAUSE CHRONIC BERYLLIUM DISEASE, A SERIOUS CHRONIC LUNG DISEASE, IN SOME INDIVIDUALS. CANCER HAZARD. OVER TIME, LUNG DISEASE AND CANCER CAN BE FATAL. TARGET ORGAN IS PRIMARILY THE LUNG.
READ THE MATERIAL SAFETY DATA SHEET (MSDS) ON FILE WITH YOUR EMPLOYER BEFORE WORKING WITH THIS MATERIAL.

Overexposure to beryllium by inhalation may cause chronic beryllium disease, a serious chronic lung disease.

• If processing or recycling produces airborne dust, fumes, or mists, use exhaust ventilation or other controls designed to prevent exposure to workers. Examples of such activities include melting, machining, welding, grinding, abrasive sawing, sanding and polishing. Any activity which abrades the surface of this material can generate airborne dust.

• The Occupational Safety and Health Administration (OSHA) has set mandatory limits on occupational exposures.

• Beryllium metal, in solid form and as contained in finished products presents no special health risks.

• Sold for manufacturing purposes only. This product can be recycled; contact your sales representative.

The Occupational Safety and Health Administration requires employers to provide training in the proper use of this product.

We strongly caution against washing or cleaning Beryllium Products with acids or solvents due to the risk of forming Beryllium Salts which may be extremely toxic.

SOLD FOR LABORATORY USE ONLY

European Risk and Safety Phrases: ND

European symbols needed: ND

Canadian WHMIS Symbols: D2A, D2B

Abbreviations used in this document

NE= Not established

NA= Not applicable

NIF= No Information Found

ND= No Data

Disclaimer

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