CAW
Health and Safety Fact Sheet

HAZARDOUS SUBSTANCE

Beryllium

What is Beryllium?

Beryllium is a hard grayish metal, brittle, and odourless. It occurs naturally as a component of mineral rocks (bertrandite and beryl). Gem-quality beryl is also known as aquamarine or emerald. Its light weight, high tensile strength and ability to slow neutrons make it useful for many purposes in many industries.

Uses of Beryllium:

- Plastic injection molds
- Fire control sprinkler heads
- Aircraft landing gear bushings
- Oilfield drill collars and friction bushings
- Current carrying springs
- Integrated circuitry sockets
- Electrical and electronic connectors
- Air bag sensors
- Pressure responsive devices
- Electro-magnetic shielding
- Many non-sparking tools
- Structural members on satellites and spacecraft
- Military and commercial guidance systems
- X-ray windows
- Optical instruments
- Laser bores and tubes
- Circuitry substrate
- Unloading shipping containers of BCM (Beryllium Containing Material)
- Golf clubs
- Dental prostheses
- Welding electrodes
- Competition bicycles
- Fluorescent lamps

Beryllium containing materials:

- Copper, nickel, aluminum alloys containing from 0.15-2.0 weight percent beryllium
- Beryllium metal
- AlBeMet (aluminum and Be)
- E-metal (Be and BeO)
- Beryllium oxide (BeO) ceramic

What is beryllium disease?

Harmful exposure to beryllium is by contact or inhalation. This may result in acute beryllium disease and chronic beryllium disease. Workers have died from beryllium disease.

Acute beryllium disease:

Acute diseases develop after a short and heavy exposure and usually last for less than one year. It may take several forms:

- Contact dermatitis (inflammation of the skin)
- Nasopharyngitis (inflammation of the nose and throat)
- Tracheobronchitis (inflammation of the windpipe and the airways beyond it)
- Pneumonitis (inflammation of the lungs confined to the walls of the air sacs)

Treatment for acute beryllium disease includes removal from exposure, bed rest, administration of oxygen and corticosteroids, which prevent inflammation.

Chronic beryllium disease (berylliosis or CBD):

CBD is a lung inflammation caused by inhaling dust or fumes of beryllium due to lung tissue sensitization and may develop months to years after exposure to beryllium.

Forms of beryllium effects:

- CBD
- Beryllium sensitization
- Skin granulomas
- Acute berylliosis
- Tracheobronchitis
- Conjunctivitis
- Lung cancer
- dermatitis

Symptoms:

- dyspnea (difficulty breathing, shortness of breath)
- weakness
- nausea
- vomiting
- diarrhea
- weight loss
- fatigue

Mistaken diagnosis:

- COPD due to cigarette smoking
- Sarcoidosis
- Silicosis
- Pulmonary fibrosis
- Asthma

The only available therapy for chronic beryllium disease is corticosteroids. Lifetime therapy is usually required for this miserable disease. A lung transplant is also a possible option, although many victims die waiting for or following the operation.

Activities at risk:

(The type of inhalation hazard depends on whether the activity is an alloy, metallic beryllium or beryllia ceramic operation.)

Abrasive blasting	Dross handling	Polishing
Abrasive processing	EDM/ECM	Pressing
Abrasive sawing	Extruding	Rolling
Annealing	Filing	Sanding
Atomizing	Firing	Sand blasting
Bonding	Grinding	Sawing
Brazing	Heat treating	Sectioning
Breaking	High speed machining	Sintering
Brushing	Honing	Sizing
Buffing	Hot forging	Slitting
Casting	Hot isostatic pressing	Smelting
Chemical etching	Hot rolling	Spray drying
Coolant management	Lapping	Soldering
Cold isostatic pressing	Laser cutting	Sputtering
Crushing	Laser machining	Tapping
Cutting	Laser scribing	Torch cutting
Deburring (grinding)	Machining	Tumbling
Destructive testing	Melting	Turning
Dicing	Milling	Vapour deposition
Drawing	Mixing powder handling	Ventilation maintenance
Drilling	Pickling	Welding

Exposure levels:

A very small quantity (below 0.00002 mg/ m^3) for a brief exposure (less than one month) can cause long-term harm. The current exposure limits (Threshold Limit Values) of the ACGIH are:

- 0.002 mg/m^3 (time-weighted average)
- 0.01 mg/ m^3 (short-term exposure limit)

A more stringent standard of 0.00002 mg/ m^3 is currently under study. The short-term exposure limit would be eliminated; and notations would be added to indicate that there is potential for worker sensitization.

How can we prevent beryllium disease?

- Substitution with less harmful substances
- Process modification
- Process enclosure
- Automation of the work procedures
- Local exhaust ventilation systems
- Good housekeeping
- Protective clothing
- Convenient washing facilities
- Good sanitation practices
- Training and education

Additional comments:
There are implications for community environmental health effects, and the transfer of dangerous work to less regulated jurisdictions. Because beryllium is pervasive and potentially harmful in such small size and quantities, it has the potential to bring harm to many victims, without their knowledge of the true cause.

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