Common Name: **BERYLLIUM**

CAS Number: 7440-41-7  
DOT Number: UN 1567 (Powder)  
DOT Hazard Class: 6 (Poison)

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HAZARD SUMMARY

* Beryllium can affect you when breathed in.  
* Beryllium is a CARCINOGEN--HANDLE WITH EXTREME CAUTION.  
* Breathing Beryllium can irritate the nose, throat and lungs. Bronchitis and/or pneumonia may occur 1-2 days after high exposure.  
* Eye contact can cause irritation, itching and burning.  
* Contact with the broken skin can cause ulcers and/or lumps (nodules) to develop.  
* Exposure to Beryllium dust can cause permanent scars to develop in the lungs.

IDENTIFICATION

Beryllium is a hard, brittle, gray-white metal. It is used in making x-ray tubes, as a moderator and reflector in nuclear reactors, and in aircraft brakes.

REASON FOR CITATION

* Beryllium is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS, NFPA and EPA.  
* This chemical is on the Special Health Hazard Substance List because it is a CARCINOGEN.  
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is $0.002 \text{ mg/m}^3$ averaged over an 8-hour workshift; $0.005 \text{ mg/m}^3$ as a ceiling limit not to be exceeded during any 15-minute work period; and $0.025 \text{ mg/m}^3$ as an acceptable maximum peak, permitted for any 30-minute period, above the ceiling limit.

NIOSH: The recommended airborne exposure limit is $0.0005 \text{ mg/m}^3$, which should not be exceeded at any time.

ACGIH: The recommended airborne exposure limit is $0.00005 \text{ mg/m}^3$ averaged over an 8-hour workshift and $0.0002 \text{ mg/m}^3$ as a STEL (short-term exposure limit) for the inhalable fraction.

* Beryllium is a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.  
* A regulated, marked area should be established where Beryllium is handled, used, or stored.  
* Wear protective work clothing.  
* Wash thoroughly immediately after exposure to Beryllium and at the end of the workshift.  
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Beryllium to potentially exposed workers.
This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Metal, metal compounds and alloys are often used in “hot” operations in the workplace. These may include, but are not limited to, welding, brazing, soldering, plating, cutting, and metallizing. At the high temperatures reached in these operations, metals often form metal fumes which have different health effects and exposure standards than the original metal or metal compound and require specialized controls. Your workplace can be evaluated for the presence of particular fumes which may be generated. Consult the appropriate New Jersey Department of Health and Senior Services Hazardous Substance Fact Sheet.

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HEALTH HAZARD INFORMATION

Acute Health Effects
The following acute (short-term) health effects may occur immediately or shortly after exposure to Beryllium dust:

* Breathing Beryllium can irritate the nose, throat and lungs, causing nasal discharge, tightness in the chest, cough, shortness of breath, and/or fever. Bronchitis and/or pneumonia may occur 1-2 days after high exposure.
* Eye contact can cause irritation, itching and burning.

Chronic Health Effects
The following chronic (long-term) health effects can occur at some time after exposure to Beryllium and can last for months or years:

Cancer Hazard
* Beryllium is a CARCINOGEN in humans. It has been shown to cause lung cancer.
* Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard
* According to the information presently available to the New Jersey Department of Health and Senior Services, Beryllium has been tested and has not been shown to affect reproduction.

Other Long-Term Effects
* Contact with the broken skin can cause ulcers and/or lumps (nodules) to develop.
* Exposure to Beryllium dust can cause permanent scars to develop in the lungs. Symptoms may include fatigue, shortness of breath, weight loss, and poor appetite. These effects may occur months or years after exposure. In severe cases disability and heart failure occur.

MEDICAL

Medical Testing
For those with frequent or potentially high exposure (half the PEL or greater), the following are recommended before beginning work and at regular times after that:

* Chest x-ray and lung function tests

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures
* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically transfer Beryllium from drums or other storage containers to process containers.
* Before entering a confined space where Beryllium powder may be present, check to make sure that an explosive concentration does not exist.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by Beryllium should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Beryllium.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with Beryllium, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted Beryllium, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where Beryllium is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, applying cosmetics, smoking, or using the toilet.
* Use a vacuum to reduce dust during clean-up. DO NOT DRY SWEEP.
* When vacuuming, a high efficiency particulate air (HEPA) filter should be used, not a standard shop vacuum.

**PERSONAL PROTECTIVE EQUIPMENT**

**WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT.** However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

**Clothing**
* Avoid skin contact with Beryllium. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

**Eye Protection**
* Wear eye protection with side shields or goggles.
* Contact lenses should not be worn when working with this substance.

**Respiratory Protection**

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.** Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

* Where the potential exists for exposure over 0.00005 mg/m³, use a NIOSH air-purifying, full-facepiece respirator with a N100, R100 or P100 filter.
* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect Beryllium, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.

* Where the potential exists for exposure over 0.00005 mg/m³, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to 4 mg/m³ is immediately dangerous to life and health. If the possibility of exposure above 4 mg/m³ exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

**HANDLING AND STORAGE**

* Prior to working with Beryllium you should be trained on its proper handling and storage.
* A regulated, marked area should be established where Beryllium is handled, used, or stored.
* Beryllium may react with WATER or MOISTURE to produce heat.
* Beryllium is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); PHOSPHORUS; CHLORINATED HYDROCARBONS (such as CARBON TETRACHLORIDE and TRICHLOROETHYLENE); METALS; and MOLTEN LITHIUM.
* Store in tightly closed containers in a cool, dry, well-ventilated area away from HEAT and COMBUSTIBLES.
* Sources of ignition, such as smoking and open flames, are prohibited where Beryllium powder is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 984-7407 (fax)

Web address: http://www.state.nj.us/health/ehoh/odisweb/

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.
DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

CFR is the Code of Federal Regulations, which consists of the regulations of the United States government.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

IRIS is the Integrated Risk Information System database of the federal EPA.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEL is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.
Common Name: BERYLLIUM  
DOT Number: UN 1567 (Powder)  
DOT Hazard Class: 6 (Poison)  
NAERG Code: 134  
CAS Number: 7440-41-7

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CARCINOGEN  
POISONOUS FUMES ARE PRODUCED IN FIRE  
DO NOT USE WATER ON BERYLLIUM POWDER

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* Beryllium is noncombustible in solid form, but may cause an explosion in powder or dust form.  
* Use dry clay, sand, ground limestone or Class D extinguishers.  
* DO NOT USE WATER, CO₂, or Halon.  
* POISONOUS FUMES ARE PRODUCED IN FIRE, including Beryllium Oxide.  
* If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

SPILLS AND EMERGENCIES

If Beryllium powder is spilled, take the following steps:

* Evacuate personnel and secure and control entrance to the area.  
* Eliminate all ignition sources.  
* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.  
* DO NOT USE WATER OR WET METHOD on Beryllium powder.  
* Ventilate area after clean-up is complete.  
* Keep Beryllium out of a confined space, such as a sewer, because of the possibility of an explosion.  
* It may be necessary to contain and dispose of Beryllium as a HAZARDOUS WASTE.  Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.  
* If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300  
NJDEP HOTLINE: 1-877-WARN-DEP

HANDLING AND STORAGE  (See page 3)

FIRST AID

For POISON INFORMATION call 1-800-222-1222

Eye Contact  
* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact  
* Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing  
* Remove the person from exposure.  
* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.  
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 0 mm Hg at 68°F (20°C)  
Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name: Beryllium

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES  
Right to Know Program  
PO Box 368, Trenton, NJ 08625-0368  
(609) 984-2202

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