

The National Nuclear Security Administration's Kansas City Plant (KCP) has continually worked to create a safe workplace for its employees and has consistently complied with the regulations and standards relating to the health and safety of its workers and surrounding community. Following is a summary of beryllium facts as well as guidance and regulation of beryllium operations at the KCP.

## General Beryllium Facts

Beryllium is a silver-gray metallic element that occurs naturally in about 30 minerals. According to data collected by the [Environmental Protection Agency](#) (EPA), low levels of beryllium are present in the air and soil. From these sources, beryllium is emitted into the air and water by natural processes, such as erosion, and by the burning of coal and oil.

Since the 1940s beryllium has been used in industry. As an industrial material, beryllium strengthens other metals and possesses unique qualities, such as its ability to withstand extreme heat, remains stable over a wide range of temperatures, and functions as an excellent thermal conductor.

According to the [Occupational Health & Safety Administration](#) (OSHA) beryllium is used in consumer products, such as dental appliances, golf clubs, non-sparking tools, wheel chairs, and electronic devices. Aerospace and defense industries use products containing beryllium for structures in high-speed aircraft and space vehicles, aircraft and space shuttle brakes, satellite mirrors and space telescopes, and nuclear weapons components.

## Beryllium Health Concern

According to the [Center for Disease Control](#) (CDC) beryllium becomes a health hazard when particles of the metal become airborne in the form of dusts, mists, or fumes that can be inhaled. Inhalation of beryllium particles can result in beryllium sensitization (allergic reaction). Once sensitized, further inhalation can lead to chronic beryllium disease (CBD).

Symptoms of CBD may include a persistent, unexplained cough, shortness of breath, chest pain, fatigue, and weight loss. The disease is treatable, but not curable. Medical data indicates that certain people have a genetic characteristic that makes them more likely to become sensitized, develop an allergic reaction, to beryllium than others.

## Beryllium Use at the Kansas City Plant (KCP)

The types of industrial materials found at the KCP are the same found in commercial manufacturing facilities with common machining, plating, and cleaning operations.

Production involving beryllium has been and remains a small part of the manufacturing work performed at the KCP since the 1960s. No pure beryllium metal is processed. Copper alloys, containing very small amounts of beryllium (typically just 2 percent), are used at the KCP.

The KCP has controlled and restricted beryllium processes to approximately 0.2% (~6,100 square feet) of the 3.2 million square foot facility.

## Protecting Employee Safety and Health – Beryllium Regulation

In 1959, the KCP implemented beryllium controls in accordance with Atomic Energy Commission (AEC) published guidance. This AEC guidance established requirements for the handling, storage, personal protection, and medical requirements for beryllium.

OSHA regulations identify beryllium as a suspected carcinogen and have established requirements for the control of beryllium hazards. The KCP has implemented controls and managed beryllium hazards in accordance with these regulations.

Today, the KCP continues compliance with OSHA regulations and the U.S Department of Energy's (DOE) beryllium regulation 10 CFR 850, "[Chronic Beryllium Disease Prevention Program](#)" (CBDPP). Published in January of 2000, the DOE CBDPP regulation establishes comprehensive requirements for beryllium programs at DOE facilities.

The DOE CBDPP requirements implemented at the KCP include: engineered operational controls, personal protective equipment, workplace monitoring and sampling, employee training, and medical surveillance to assure the protection of employees working with beryllium. The regulation also establishes requirements for clean-up of processing areas, equipment, and tooling; the control of beryllium processing equipment; and general housekeeping requirements to assure protection of the workforce.

### **Procedures to Perform Beryllium Processes Safely**

Chemical Safety Plans are in place for beryllium processing areas. These plans establish controls that include identification and access control of beryllium processing areas, and include: identification of hazards, engineering and administrative controls, protective clothing and equipment including respirators, hygiene and housekeeping practices; and the provisions for area clean-up.

For those beryllium processes that have the potential for airborne particle generation, a Beryllium Work Permit is required. Safety and Health professionals issue the permit which establishes additional controls to assure the protection of the workforce.

### **Employee Training**

All KCP employees are required to complete General Awareness Overview for Beryllium Hazards and Controls training as part of KCP's overall safety and health training program. This course provides general awareness of beryllium hazards.

Chemical Carcinogen Awareness and Carcinogenic Metals Awareness training courses are mandatory for all workers who use chemical carcinogens including beryllium. These courses are designed to assure that workers understand the health effects of carcinogens and the proper controls needed to use them safely.

Beryllium hazard awareness training has been a component of KCP's training program since 1959, when the AEC published guidance on the control of beryllium processes for its facilities.

### **Medical Surveillance Program – KCP Employees**

Even though only a small number of KCP employees work or have worked with beryllium, all employees, former employees, and contract workers may enroll in the DOE's medical surveillance program at no cost to the worker.

For current workers, the Beryllium Medical Surveillance program is managed by the KCP Medical Care Services Department and is available to all employees. The medical examination includes, but is not limited to, a baseline medical examination including evaluation of respiratory system, chest x-ray and blood test for beryllium sensitivity. Currently, approximately 900 of the 2,500 KCP employees participate in the DOE Beryllium Medical Surveillance program.

Those employees who exhibit an allergic reaction (sensitization) to beryllium are referred for pulmonary evaluation at a number of pre-selected medical facilities that have requisite experience with beryllium disease. .

### **Federal Resources for Current and Former Workers**

KCP employees, former and current and subcontractors, have full access to federal resources if they have an occupational health concern. For the past decade, former workers have been informed of these resources through direct mailings, union meetings, local advertisements and public meetings. Current employees have access to onsite medical services.

- [The National Supplemental Screening Program \(NSSP\)](#) at 1-866-812-6703 is a health screening program for former U.S. Department of Energy workers.
- [Building Trades National Medical Screening Program](#) at 1-800-866-9663 is available to employees who have performed construction work at Department of Energy sites.
- [The Energy Employees Occupational Illness Compensation Program Act \(EEOICPA\)](#) at 1-866-534-0599 was activated in 2001 to provide benefits for workers who have developed a serious illness due to exposures while working for Department of Energy contractors and subcontractors in the nuclear weapons industry.

### **DOE Provisions to Control Airborne Beryllium Exposure**

The KCP's current beryllium processes are designed to control airborne exposures to below the DOE CBDPP action level of 0.2 micrograms per cubic meter of air (0.2 ug/m<sup>3</sup>). This concentration is roughly equivalent to crushing a pencil tip and disbursing it in a space the size of a football field with a height of 60 feet.

The DOE CBDPP airborne action level is significantly (ten times) less than the general industry Permissible Exposure Limit (2.0 ug/m<sup>3</sup>) set by OSHA which applies to commercial industries that use beryllium in their operations.

Personal air monitoring for ongoing beryllium processes and cleanup efforts continue to validate controls for avoiding employee exposure to beryllium airborne particles. A certified independent laboratory is used to perform analyses of KCP samples.

## DOE Beryllium Cleanliness Requirements for Surfaces

In January 2000, the DOE was the first government agency to set beryllium surface cleanliness standards. To date, OSHA has not set a beryllium surface contamination standard for general industry.

The DOE CBDPP establishes an aggressive expectation for cleaning any residual beryllium surface contamination at its beryllium processing facilities. Surfaces in beryllium processing areas must not exceed three micrograms per 100 square centimeters (3 ug/100 cm<sup>2</sup>) during non-operational periods. Removable beryllium contamination for tooling and equipment must not exceed 0.2 micrograms per 100 square centimeters prior to release to non-beryllium processing areas.

Neither the DOE nor OSHA has established beryllium cleanliness levels for surfaces in non-production areas (walls, floors, ceilings, etc.). However, as part of its beryllium program requirements, the KCP has established its own internal Housekeeping Goal of 1.0 ug/100cm<sup>2</sup>.

## Cleanup Efforts

The KCP performed a plant-wide characterization for beryllium surface contamination in 2000 and again in 2003. To date, the KCP has taken over 33,000 surface samples to characterize and clean legacy beryllium processing areas, beryllium processing items and equipment, and general plant areas to meet the DOE CBDPP cleanliness requirements.

Legacy processing areas identified as exceeding the DOE Housekeeping area have been cleaned with the exception of a few small areas. Caution signs are posted and access to these areas is restricted.

The workers conducting beryllium cleanup wear respirators, protective clothing, and follow approved safety plans. To date, airborne monitoring of these workers has detected no levels of beryllium exposure.

## KCP's Commitment to Health, Safety & Environment

The KCP takes its responsibility for the health and safety of its workers and the surrounding community seriously. Throughout its history, KCP has consistently and proactively met or exceeded city, state and federal regulations and standards relating to the health and safety of its workers via rigorous and frequent external and internal audits and reviews.

KCP's proactive HS&E programs have been validated by nationally recognized certifications such as:

- DOE's Voluntary Protection Program – STAR Certification (since 1995)
- ISO 14001, Environmental Management System Certification (since 1996)
- Missouri Quality Award 2009
- Malcolm Baldrige National Quality Award 2010

Additionally, in 2010, the DOE Office of Inspector General conducted a six-month comprehensive assessment of KCP's HS&E programs, including its beryllium program. The final report, "[Audit Report on Environment and Worker Safety Control Systems](#)" found the KCP had established and implemented controls to adequately protect the environment and workers.

Beryllium Limits				
	OSHA Regulation	DOE Regulation	KCP	General Industry
<b>Airborne (ug/m3)</b>	<b>2.0</b>	<b>0.2</b>	<b>0.2</b>	<b>2.0</b>
<b>Surfaces (ug/100 sq cm) in Beryllium Processing Areas</b>	<b>Not Addressed</b>	<b>3.0</b>	<b>3.0</b>	<b>Not Addressed</b>
<b>Surfaces (ug/100 sq cm) in non-Beryllium Processing Areas</b>	<b>Not Addressed</b>	<b>Not Addressed</b>	<b>1.0 goal</b>	<b>Not Addressed</b>
<b>Equipment Released to General Commerce (ug/100 sq cm)</b>	<b>Not Addressed</b>	<b>0.2</b>	<b>0.2</b>	<b>Not Addressed</b>

<sup>1</sup> Throughout this fact sheet wherever work with beryllium is mentioned in the context of the Kansas City Plant, the term "beryllium" refers to a copper-beryllium alloy containing up to 2% beryllium. In accordance with 10 CFR 850.3, alloys containing greater than 0.1% beryllium qualify as beryllium materials.