

Ames Laboratory Beryllium Factsheet

June 2009

What is beryllium?

Beryllium is a hard, lightweight metal that is very strong and easy to shape. It has many industrial uses. Beryllium-copper alloys and beryllium-oxide ceramics are used in the electronic, nuclear and aerospace industries. Beryllium parts for nuclear weapons were manufactured and used at a number of Department of Energy (DOE) laboratories. This manufacturing process continues at some laboratories today.

How was beryllium used at the Ames Laboratory?

Beryllium was used routinely at the Ames Laboratory in the 1940s and early 1950s. In the 1940s, it was used in the processes developed at the Laboratory for the production of highly pure uranium and thorium for the historic Manhattan Project. Ames Lab metallurgists also worked on a process to produce pure beryllium metal from beryllium fluoride. In the early 1950's, beryllium oxide powder was used to produce beryllium shapes and crucibles. The toxicity of beryllium was not well known until after WWII when greater efforts were made to minimize exposure. Present-day buildings in which purification work would have occurred include Wilhelm Hall, Spedding Hall, and Gilman Hall on the Iowa State University campus.

Is beryllium still used at the Ames Laboratory?

Since the 1950's, beryllium has only been used on a limited basis at the Ames Laboratory. The quantities are small and used in such a way as to not generate ambient concentrations. No machining or grinding of beryllium is performed at the Ames Lab. Beryllium is also a constituent of some materials used at the Laboratory. For example, beryllium is a constituent of the windows used for cryostats and X-ray beam paths. There is virtually no potential for exposure to employees in these forms.

How do you become exposed to beryllium?

Workers who were exposed to beryllium dust or fumes during machining and manufacturing operations may develop sensitivity to beryllium or, ultimately, chronic beryllium disease (CBD). Machinists, welders and operators could be exposed to beryllium through direct handling of beryllium and beryllium compounds. Other workers could have been exposed by performing laboratory analyses on beryllium compounds, coming into contact with contaminated equipment, working near a beryllium operation or by accessing beryllium-contaminated ventilation systems or building utilities located in beryllium-contaminated interstitial spaces.

What types of ventilation systems were used and what is an interstitial space?

The primary engineering system utilized at Ames Laboratory for work with hazardous materials, such as beryllium, is the chemical fume hood ventilation system. This system protects hood users and lab occupants from exposure by containing gaseous and particulate chemicals which are then drawn out of the hood, up an exhaust stack (chimney) by a fan on the roof. During the exhaust process it is possible for some of material to be deposited on the interior surface of the chimney, in cracks, crevices and surfaces inside the hood, or roof fan.

Interstitial spaces are behind walls, inside utility closets, or above ceilings, and are only accessed by personnel performing maintenance or inspections and are not accessible to the vast majority of Laboratory personnel. When accessed, workers wear personal protective equipment.

What are the symptoms, and is beryllium disease treatable?

The symptoms include shortness of breath, especially with activity; cough; chest pain; fatigue; and weight loss or loss of appetite. Today, chronic beryllium disease is not considered a fatal condition. For a few people, however, it can be serious enough to cause disability. Basically, beryllium disease causes inflammation and scarring of the lungs. Treatment includes prescription drugs and regular medical exams. Some people can be diagnosed with the disease but have no symptoms. Approximately 4 to 5 percent of DOE workers screened have shown an increased sensitivity to beryllium. Of those, 1 to 2 percent have contracted CBD.

Has the Ames Laboratory tested buildings to ensure they are beryllium free?

Yes. Ames Laboratory, in cooperation with ISU, conducted wipe sampling surveys in 2001, 2005, 2008 and 2009. Representative samples were collected from ceilings, walls, desktops, lab benches and window ledges as well as “non-public” areas such as utility chases and mechanical rooms. Buildings sampled included Wilhelm Hall, Spedding Hall, Metals Development and Gilman Hall. Sampling results of publicly accessed areas have shown no beryllium concentrations above detection limits. Several sampling results in ventilation systems only accessible by facilities personnel have shown areas with detectable beryllium on surfaces. Additional sampling is ongoing and will provide better characterization of Ames Laboratory buildings.

What is the Former Worker Medical Surveillance Program?

The Former Worker Medical Screening Program (FWP) supports the Office of Health and Safety's mission and strategic response by funding external teams of health experts to independently offer medical screening to former workers who may be at significant risk for occupational diseases. Beryllium screening is now a part of all medical surveillance performed on former workers. Beryllium screening consists of a blood test and a brief health questionnaire. The process takes only a few minutes and is paid for by the DOE.

Can current employees of Ames Laboratory receive medical screening?

Yes. Current Laboratory employees can receive medical screening at the Occupational Medicine office located in G11 TASF (515/294-2056). The screening is paid for by Ames Laboratory.