

# Tech Fact Sheet

DOE-Environmental Management

DOE – Complex Wide

## Review of Beryllium Management Practices at Rocky Flats During Closure Operations

### Challenge

Beryllium (Be) metal is used by DOE in weapons production, as a reactor moderator or reflector, and as a fuel element cladding. Workers who are exposed to high concentrations of beryllium often develop acute beryllium disease caused by the inhalation of beryllium dust or particles which can cause Be sensitivity or chronic Be disease (CBD), a disabling and often fatal lung disease. A review of Rocky Flats Environmental Technology Site (RFETS) Be practices put in place by Kaiser-Hill, the cleanup contractor, was initiated to determine the effectiveness of RFETS beryllium characterization and prevention programs and to determine what, if any, suggestions could be provided to other DOE sites with facilities potentially contaminated with Be.



Figure 1: Rocky Flats Before Cleanup



Figure 2: Rocky Flats After Cleanup

### Tech Solution

Administrative and engineering controls, along with detailed medical and training programs and strict adherence to all characterization, sampling, and work procedures ensured that exposure to beryllium by RFETS employees was minimized to the highest extent possible. Practices at RFETS in different beryllium contaminated areas are highlighted below.

Beryllium Regulated Areas (BeRA)	Beryllium Controlled Areas (BeCA)	Potentially Contaminated Equipment or Systems and Historical Areas
<ul style="list-style-type: none"> <li>• Posted “Danger” signs</li> <li>• Used log to control access and record entry and exit</li> <li>• Used step-off pads to control contamination</li> <li>• Used HEPA filter vacuums and wet mopping to minimize Be airborne exposure</li> <li>• Required the use of PPE and respiratory protection</li> <li>• Encouraged workers to sanitize themselves by washing hands and face prior to eating, drinking, or smoking, and by showering prior to leaving the area</li> </ul>	<ul style="list-style-type: none"> <li>• Posted “Caution” signs</li> <li>• Required PPE, respiratory protection, and appropriate controls of area reviewed by Industrial Hygiene (IH) personnel</li> <li>• Work areas were reviewed by IH prior to start activities</li> <li>• Airborne Be monitoring in place</li> <li>• Workers were Be screened</li> </ul> 	<ul style="list-style-type: none"> <li>• No special requirements for personnel entering or performing work in the area</li> <li>• Industrial Hygiene personnel evaluated the systems and areas to ensure proper control prior to performing intrusive work activities</li> </ul> 
<p><b>Non-Beryllium Areas:</b> Random quarterly samples were taken to document the negative assessment</p>		

Site Project & Identifier
DOE (HQ) - Office of Deactivation and Decommissioning and Facility Engineering

Tech Stage: Technical Assistance
Lessons learned from past experience and study of workers exposure to beryllium at RFETS

## Tech Accomplishments

The observations on Be evolved from the studies at RFETS, as well as follow-on studies at the other DOE sites across the complex that participated in the Be-Associated Worker Registry started at RFETS and have cumulated into the following information:

- Not all individuals exposed to Be get sensitized or acquire CBD
- The period of latency for sensitivity to Be and CBD can be weeks, months, or even years
- The number of sensitization and CBD cases is between 0% and 4% of the site population, with one-third of them as CBD cases and two-thirds as sensitization cases
- 75% were 40-plus years of age
- 83% were males
- No threshold of safety; since sensitization and CBD was been found down to the limits of detection
- New cases of Be sensitization and CBD continue to be reported.
- Genetic predisposition appears to link to the development of CBD

The level of exposure at which a person becomes sensitized and will progress on and acquire CBD has not been found. Current research suggests that genetics and immunologic factors play a role in determining who, when exposed to Be, will become sensitized and who will acquire CBD.

## Impact

The processes and procedures followed by Kaiser-Hill during the closure of RFETS complied with DOE's requirements. Kaiser-Hill did not develop any approaches that were significantly advanced beyond compliance with regulatory requirements. However, Kaiser-Hill's approach did clearly identify areas where Be was present or suspected to be present, and a conservative approach was taken to ensure protection of workers. Due to the long latency period for Be sensitization and/or CBD and the fact that the RFETS closure was not completed until 2006, it is too early to make any conclusions concerning the effectiveness of the policies and procedures implemented at RFETS. It is important to note that it was the early work at RFETS that laid the groundwork for DOE's current Be-Associated Worker Registry.

### Impact and Features

- Administrative and engineering controls, along with detailed medical and training programs and strict adherence to all characterization, sampling, and work procedures ensured that exposure to beryllium by RFETS employees was minimized to the highest extent possible.
- Current research suggests genetics and immunologic factors affect who will become sensitized and who will acquire CBD.

<b>Vendor/Provider Information</b>	DOE Legacy Management Office
<b>Tech Information Reviewer</b>	Andrew Szilagyi, EM-44 301-903-4278 <a href="mailto:andrew.szilagyi@em.doe.gov">andrew.szilagyi@em.doe.gov</a>
<b>Technology Name</b>	Beryllium Management Practices [MSE-203(June 2009)]
<b>HQ Project Lead</b>	Andrew Szilagyi EM-44 301-903-4278 <a href="mailto:andrew.szilagyi@em.doe.gov">andrew.szilagyi@em.doe.gov</a>

Challenge Category	Solution Category
<ul style="list-style-type: none"> <li>• Beryllium chronic disease</li> <li>• Worker health and safety</li> <li>• CBD</li> </ul>	<ul style="list-style-type: none"> <li>• Past experience study/lessons learned</li> <li>• Occupational/medical/health surveillance</li> <li>• Prevention measures/programs</li> </ul>