



Rocky Mountain
Remediation Services, L.L.C.
... protecting the environment

DIRECTIVE

BERYLLIUM HANDLING PRACTICES AND LEVELS

OPS-DIR-003

Revision 0

Date Effective: 03/24/97

APPROVED: _____

FPH
Sr. Vice President, Operations

Page 1 of 3

RMRS Beryllium Practices at Rocky Flats

1.0 PURPOSE/SCOPE

The purpose of this directive is to provide guidance for RMRS employees to assure protection of human health and the environment when beryllium or beryllium contaminated materials are present. This directive identifies administrative practices for protection of personnel and the environment at levels that are as low as reasonably achievable (ALARA). The information in this procedure does not supersede or replace the requirements of other regulatory documents or site procedures, but clarifies necessary and sufficient practices for the protection of personnel and the environment when beryllium is present.

2.0 REGULATORY VALUES

Protective levels for beryllium contamination have been specified in regulations for air effluent, surface discharge, and listed hazardous waste. These values do not apply to industrial hygiene (IH) concerns associated with beryllium contamination on internal and external surfaces. The Personnel Exposure Limit (PEL) for beryllium applies to all activities and is monitored by air sampling equipment specified by IH personnel. This OSHA 8-hour, time-weighted average exposure limit of 2 micrograms per cubic meter, is protective of personnel during beryllium mining or milling operations, but no such value exists for worker's protection from surface contamination. Thus, administrative practices will be utilized to accommodate safety concerns until a regulation directly applies.

REGULATIONS	REGULATORY VALUE	COMMENTS
CAA (HAP&NESHAP)	250lb/yr, 10g/24hr* & 0.01ug/30d ave**	*CAQCC Reg8 & 40CFR61.32 **Ambient concentrations
CWA	4ppb	CWQCC seg 4&5
RCRA (listed) (LDR)	None, unless pure 0.014 NWW, 0.82 VW	

10-301 10-10

OPS-DIR-003

3.0 ADMINISTRATIVE PRACTICES

Any person who works with beryllium or has the potential for exposure to beryllium, as determined by IH, will be placed on the medical control program. Participants in this program receive specialized training and may be subject to medical surveillance.

3.1 General Housekeeping

Adequate protection of personnel requires that IH assess the potential beryllium exposure for each worker space. This evaluation will be documented in building or project manager's files. Discovery of an area (by smear sampling) having beryllium dust in excess of 25 ug/square foot (an industrial standard and a value reflected in site procedures), will require beryllium cleanup. IH will write a beryllium abatement plan addressing the training, PPE, and cleanup actions. Cleanup will, at a minimum, include: qualified beryllium workers, surface wetting to suppress resuspension, wet/dry vacuuming or wet wiping to remove the dust, and breathing zone monitoring during cleanup operations. A second smear sampling will be conducted to assure cleanup goals are achieved. Annual sampling is required for these areas exceeding the 25 ug/ft² to verify the absences of contamination as long as RMRS workers remain in the area.

4.0 GENERATION

During the project planning phase, characterization is required to determine the potential hazards, as well as, the amount/type of waste that will be generated. All beryllium containing wastes and beryllium contaminated equipment will be handled to minimize the potential exposure. Beryllium is not a hazardous waste, unless it is pure powered beryllium found in a lab container. RCRA does not regulate beryllium except when pure. Thus, beryllium is managed in a manner that minimizes environmental releases and is protective of human health. Beryllium waste will be bagged/labeled and managed for its other constituents. If surface values for beryllium exceed the 25 ug/ft² smearable, these areas should be decontaminated utilizing the housekeeping methodology.

5.0 TRANSPORTATION

Movement of beryllium waste and equipment containing beryllium on and off-site is controlled by DOT regulations. Transportation of beryllium waste requires double bagging and labeling. These bags should be placed inside a proper DOT regulated container as required by the regulated constituents. Characterization data and a regulatory evaluation are necessary to document the shipment. Materials contaminated with or containing beryllium have no regulatory requirements, other than the DOT shipping regulations. Waste containing beryllium has LDR requirements specified in 6 CCR 1007-3 section 268 of the CHWA.

Transferring of beryllium contaminated equipment from RFETS to DOE or other government sites will be completed by encapsulating the equipment in the equivalent of "double bagging," labeling the exterior of

the shipping container with "surfaces potentially contaminated with beryllium," and forwarding documented process knowledge of the equipment or material to the next site.

Release of beryllium contaminated equipment or material leaving the Site to areas other than DOE or any government facility, will only be accomplished with DOE written approval. The documentation process shall include, at a minimum, the following items:

1. Describe the materials to be released and characterization data,
2. Provide beryllium characterization data & decontamination information,
3. Document shipping location and complete packaging and labeling, and
4. Forward all information to DOE, RFETS and receive approval for the shipment.

Waste contaminated with beryllium will be regulated for the other constituents present, and forwarded with LDR documentation for beryllium to the disposal site. Contact Waste Management for specific documentation for processing.

6.0 CONTACT PERSONNEL

If there are questions on this guidance or if additional areas need clarification, contact Ruth McCafferty of RMRS Industrial Hygiene, or Gary Konwinski, the RMRS Environmental Manager.

7.0 REFERENCES

Additional information on beryllium is available from the "Kaiser-Hill Position Paper on Beryllium," WAH-018-97 (see Appendix A).

**KAISER-HILL COMPANY, L.L.C.
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
POSITION PAPER ON BERYLLIUM**

I. BACKGROUND

Rocky Flats Environmental Technology Site (Rocky Flats) is located 16 miles northwest of Denver, Colorado, and is part of the United States Department of Energy (DOE) nuclear weapons complex. Research and development operations using beryllium at Rocky Flats began in 1953, with beryllium production commencing in 1957. Employees engaged in foundry operations, casting, shearing, rolling, cutting, welding, machining, sanding, polishing, assembly, and chemical analysis operations or by-standers to these operations were potentially exposed to airborne beryllium aerosols. The exposure levels varied among the different operations.

The potential health effect which results from exposure to airborne beryllium aerosols is Chronic Beryllium Disease (CBD). Exposure to airborne beryllium aerosols may also result in beryllium sensitization prior to developing CBD. CBD is a chronic granulomatous disorder of the lungs. In June 1984, the first documented case of CBD was diagnosed in a beryllium machinist. There are currently 73 cases of CBD and 127 cases of sensitization among former and current Rocky Flats workers. (1)

II. BERYLLIUM HEALTH SURVEILLANCE PROGRAM

A Beryllium Health Surveillance Program (BHSP) was established in June 1991 at Rocky Flats to provide medical surveillance for current and former employees exposed to beryllium. The BHSP uses the beryllium lymphocyte proliferation test (BeLPT) to identify those individuals who have developed beryllium sensitivity. A detailed medical evaluation is offered to those individuals identified as beryllium sensitized or to those who have chest X-ray changes suggestive of CBD. The BHSP is a voluntary participation program offered to all current and former employees of prime contractors, subcontractors, and DOE. (1,2)

III. MEDICAL SCREENING

Beryllium workers are defined and identified by Line Management and Industrial Hygiene as those workers who may be exposed to beryllium aerosol concentrations of 0.5 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) or greater based on an eight hour time weighted average (TWA). Workers identified as beryllium workers receive an initial, annual, and termination medical examination. Those examinations include a medical, occupational, and respiratory (American Thoracic Society) history; a physical examination with emphasis on the respiratory system, pulmonary function testing, chest X-ray, and a BeLPT.

IV. HISTORY OF BERYLLIUM MONITORING AND CONTROLS

The Occupational Safety and Health Administration (OSHA) has a permissible exposure limit standard of 2 $\mu\text{g}/\text{m}^3$, as listed in 29 CFR 1910.1000 (established in 1970), Limits for Air Contaminants. (4) This standard is currently the basis of the DOE standard and is recognized by Kaiser-Hill Company, L.L.C (Kaiser-Hill).

Since 1989, a more conservative airborne exposure limit has been voluntarily adopted at the Rocky Flats Plant and subsequently by Kaiser-Hill. Specifically, the National Institute for Occupational Safety and Health criterion level of 0.5 $\mu\text{g}/\text{m}^3$ has been adopted. (3)

A facility cleanliness standard of 25 micrograms per square foot ($\mu\text{g}/\text{ft}^2$), for surfaces accessible to workers has been adopted and used at Rocky Flats since the 1980's. This standard was developed by the Atomic Energy Commission in approximately 1949. (3)

Kaiser-Hill requires all subcontractors to follow an "As Low As Reasonably Achievable" (ALARA) policy for beryllium exposures, per site Health and Safety Practice Manual (HSP) guidelines. This is accomplished by keeping air and surface contamination lower than required limits. ALARA considerations include the design and modification of facilities, equipment, and demolition projects where beryllium may be present. (3)

All beryllium workers must successfully complete a Beryllium Operations Computer Based Training Program and test. Personal, area and surface monitoring is conducted by Industrial Hygiene to assess the airborne and surface levels of beryllium during projects and inside facilities. Personal protective equipment (PPE) is specified by Industrial Hygiene and Radiological Engineering and made available to all beryllium workers.

V. PLANS FOR THE FUTURE

Kaiser-Hill will continue to improve the Site Beryllium Program wherever possible. These efforts include implementing new methods of control developed from the knowledge base of epidemiology, toxicology, and exposure science. (5)

Current efforts by Kaiser-Hill to continue the Beryllium Health Surveillance Program, Site Facility Characterizations, Industrial Hygiene Monitoring, Employee Training, Engineering Design, and Local Standards Review, are regarded as both proactive and conservative from the Health & Safety, and Medical communities.

The ultimate goal is to preclude any future sensitization and chronic beryllium disease, while moving forward with an established deactivation schedule for Rocky Flats.

References

1. Stange AW, Furman FJ, Hillmas DE. Possible health risks from low level exposure to beryllium. *Toxicology* 111 1996:213-224.
2. Stange AW, Furman FJ, Hillmas DE. Rocky Flats Beryllium Health Surveillance. *Environmental Health Perspectives* 1996;Vol 104,Supplement 5, 981-986.
3. Rocky Flats Plant Health and Safety Practices Manual, 1-15310-HSP-13.04, Beryllium Protection, 1992:1-22.
4. Code of Federal Regulations, 29 CFR Part 1910 (1910.1000 To End) Revised July 1, 1994.
5. American Industrial Hygiene Association White Paper on Risk Assessment, Adopted by Board of Directors: December 7, 1994:1-6.