UPDATE ON BERYLLIUM

EEI Spring Safety and Health Committee Conference
New Orleans
OSHA REGULATORY AGENDA

- **Title:** Occupational Exposure to Beryllium

- **Abstract:** In 1999 and 2001, OSHA was petitioned to issue an emergency temporary standard by the Paper Allied-Industrial, Chemical, and Energy Workers Union, Public Citizen Health Research Group, and others. The Agency denied the petitions but stated its intent to begin data gathering to collect needed information on beryllium's toxicity, risks, and patterns of usage. On November 26, 2002, OSHA published a Request for Information (RFI) (67 FR 70707) to solicit information pertinent to occupational exposure to beryllium including: Current exposures to beryllium; the relationship between exposure to beryllium and the development of adverse health effects; exposure assessment and monitoring methods; exposure control methods; and medical surveillance. In addition, the Agency conducted field surveys of selected work sites to assess current exposures and control methods being used to reduce employee exposures to beryllium. OSHA convened a Small Business Advocacy Review Panel under the Small Business Regulatory Enforcement Fairness Act (SBREFA) and completed the SBREFA Report in January 2008.
OSHA REGULATORY AGENDA

- **Agency:** Department of Labor (DOL)
- **Priority:** Economically Significant
- **Agenda Stage of Rulemaking:** Pre-rule Stage
- **CFR Citation:** 29 CFR 1910
- **Timetable:**
  - Request for Information 11/26/2002 67 FR 70707
  - SBREFA Report Completed 01/23/2008
  - Peer Review of Health Effects and Risk Assessment Due 03/00/2010
- **Regulatory Flexibility Analysis Required:** Yes
- **Small Entities Affected:** Businesses

- **Agency Contact:**
  Dorothy Dougherty
  Director, Directorate of Standards and Guidance
  Department of Labor
  Occupational Safety and Health Administration
  200 Constitution Avenue NW., FP Building, Room N-3718,
  Washington, DC 20210
  Phone: 202 693-1950
  Fax: 202 693-1678
  Email: dougherty.dorothy@dol.gov
WHAT IS BERYLLIUM?

- A naturally occurring element
- Atomic number 4
- 44th most common element
- Can exist naturally in over 30 mineral species and several forms
  - Silicates
  - Salts
  - Oxide
WHAT IS BERYLLIUM?

- Several unique physical properties
  - Strength to weight
  - Dimensional stability
  - X-ray transparency
  - Thermal conductivity

- Used industrially in various forms
  - Metal
  - Alloy
  - Ceramic
WHY IS OSHA INTERESTED?

- Acute berylliosis
  - Caused by “high” exposures (>100 µg/m³)
  - May cause delayed chemical pneumonitis
  - Very rare since the 1940’s

- Beryllium sensitization
  - A small percentage of people are or may become hypersensitive
  - Estimates are that approximately 1% of the population is naturally hypersensitive
  - Sensitization rates in occupationally exposed individuals vary from 1-15%
  - Sensitization may occur in only a few months
  - Some studies indicate that sensitization may occur primarily through dermal exposure
WHY IS OSHA INTERESTED?

- Chronic beryllium disease (CBD)
  - May occur in sensitized individuals
  - A progressive, inflammatory, granulomatous lung condition
  - May be disabling or even fatal
  - May be misdiagnosed as sarcoidosis or other similar disease

- Lung cancer
  - Beryllium is listed as a known human carcinogen by IARC and NTP
  - Beryllium is listed as a probable human carcinogen by EPA
WHEN MIGHT THIS HAPPEN?

- “Best guess” for a Notice of Proposed Rulemaking is early 2011
- Final rule promulgation expected in 2012
WHY SHOULD I CARE?

- Beryllium is found naturally in coal
  - Lignite: 2.6 ppm ± 0.8
  - Sub-bituminous: 8.2 ppm ± 3.3
  - Bituminous: 3.0 ppm ± 1.2
  - Anthracite: 19.0 ppm ± 9.0

- Beryllium oxide will be formed in the combustion process
- Beryllium levels will be found in resulting ash
WHAT IS OSHA SAYING NOW?

- Safety and Health Information Bulletin “Preventing Adverse Health Effects From Exposure to Beryllium on the Job”
  - Current allowable limits may not be protective
  - Engineering controls
    - Process enclosures, exhaust ventilation
  - Work practices
    - HEPA vacuums, clean surfaces
  - Hygiene
    - Work uniforms, shower
WHAT IS OSHA SAYING NOW?

- Safety and Health Information Bulletin “Preventing Adverse Health Effects From Exposure to Beryllium on the Job”
  - Respiratory protection
  - Training
  - Health screening
    - Chest x-ray
    - Beryllium Lymphocyte Proliferation Test (BeLPT)
WHAT MIGHT OSHA LOOK AT?

- Other OSHA standards
  - Chrome +6
  - Lead
- Department of Energy (DoE) program
- Industry practice
  - Brush Ceramics Inc.
    - Tucson, AZ
      - NIOSH studies showed that pre-2000 sensitization rates were approximately 10%
      - Post-2000 rates were <1%
      - Current rates are <0.5%
      - Difference was due to a comprehensive, multi-level program
WHAT MIGHT BE INCLUDED?

○ Exposure limits
  ● Current OSHA PEL: 2 μg/m$^3$ TWA, 5 μg/m$^3$ ceiling, 25 μg/m$^3$ peak
  ● Current NIOSH REL: 0.5 μg/m$^3$ ceiling
  ● Current ACGIH TLV: 0.05 μg/m$^3$ TWA

○ Most *likely* to be included
  ● 0.2 μg/m$^3$ TWA, 0.1 μg/m$^3$ Action Level
  ● Levels used by OSHA in their economic impact study
  ● Currently used by DoE for respiratory protection
  ● Potential pressure to use ACGIH limit
WHAT MIGHT BE INCLUDED?

- Regulated areas
  - Required where exposures exceed PEL
  - Isolation and demarcation
  - Authorized entry

- Protective clothing
  - Overgarments?
  - Company supplied uniforms?

- Hygiene facilities
  - Eating facilities?
  - Shower facilities?
WHAT MIGHT BE INCLUDED?

- Engineering controls
  - Dust collection systems?
  - Shower systems?
- Respiratory protection
  - Medical questionnaire does include beryllium
  - Keep in mind protection factors, half face may not be adequate for some tasks
- Training
  - Documentation, records retention
  - Employee concern (“Why didn’t you tell me?”)
WHAT MIGHT BE INCLUDED?

○ Housekeeping
  ● “As free as practicable”? 
  ● “Visually clean”? 
  ● Department of Energy guidelines?
    ○ “Housekeeping efforts must maintain removable surface contamination at or below 3 µg/100 cm² during non-operational hours.”
    ○ “Removable contamination on equipment surfaces must not exceed 3 µg/100 cm² when released to other beryllium handling facilities.”
    ○ “Removable contamination on equipment surfaces must not exceed 0.2 µg/100 cm² when released to the public or for non-beryllium use.”
WHAT MIGHT BE INCLUDED?

- Medical surveillance
  - Beryllium Lymphocyte Proliferation Test (BeLPT)
  - Tests for sensitization only, not disease
  - Several drawbacks with the test
    - People’s results can “bounce”
    - Test fairly predictive of disease in highly exposed workers, but not in marginally exposed workers
  - At what level?
  - At what frequency?
  - Medical removal?
WHAT WOULD MAKE IT WORSE?

- EPA gets involved
  - EPA has identified coal fired power plants as a source of beryllium contamination
    - National Primary Drinking Water Regulations: “[Beryllium] is released principally in the smoke stacks and ash wastes of power plants which burn coal.”
    - Toxicological review in support of the Integrated Risk Information System (IRIS): “More than 99% of beryllium emitted into the atmosphere is the result of oil or coal combustion for electric power generation.”
WHAT WOULD MAKE IT WORSE?

- EPA gets involved
  - Beryllium is currently listed under the National Emissions Standard for Hazardous Air Pollutants (NESHAP) standard
    - “Beryllium manufacturing facilities” limited to emissions of 10 g/day
  - Extend NESHAP to power plants?
  - Community concerns?
  - Soil sampling?
  - Community medical surveillance?
WHAT HAS APS SEEN?

- APS has limited data:
  - 46 full shift results, 44 were non-detect at <0.05 or <0.06 µg/m³
  - Samples were of normal operations and maintenance work
  - Two results were 0.05 and 0.11 µg/m³. They were during cutting and prepping water wall tubes in the Super-heat section of the boiler (the boiler had been water washed before the work).
WHAT SHOULD I DO?

- Perform air sampling for beryllium
  - Emphasize “worst case” jobs
  - Consider “migration”

- Review medical histories of employees
  - Incidence of pulmonary issues?
  - Potential misdiagnoses?

- Review beryllium levels in incoming coal
  - How consistent is it?
  - Correlation between coal levels and air levels?
WHAT SHOULD I DO?

- **Be ready to comment**
  - Have data ready
  - Possible industry exemption?
    - Similar to portland cement in chrome +6
  - Partner with other industries?
    - Earthmoving?
    - Agriculture?
  - Argue to limit scope to beryllium manufacturing only?
  - Argue to utilize minimum percentage?
QUESTIONS?