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The Search for Common Themes in Lessons Learned from Beryllium Assessments at DOE Sites

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Beryllium Health and Safety Committee Webinar

14 May 2015

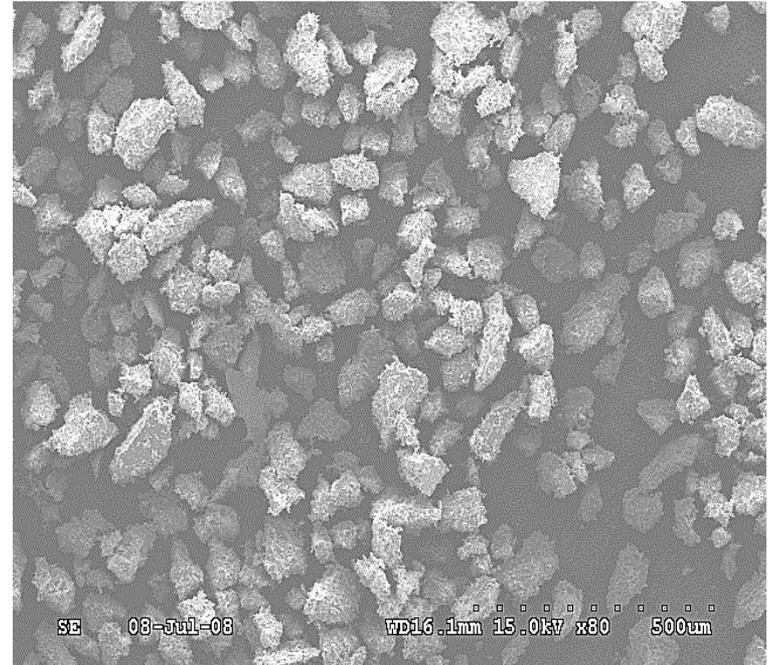
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Outline

- Introduction to the topic, and why we should do this
- Summary of major DOE assessments of site beryllium programs
- Discussion within BHSC Sampling and Analysis Subcommittee
- Additional thoughts from the author
- Group discussion, and where do we go from here?

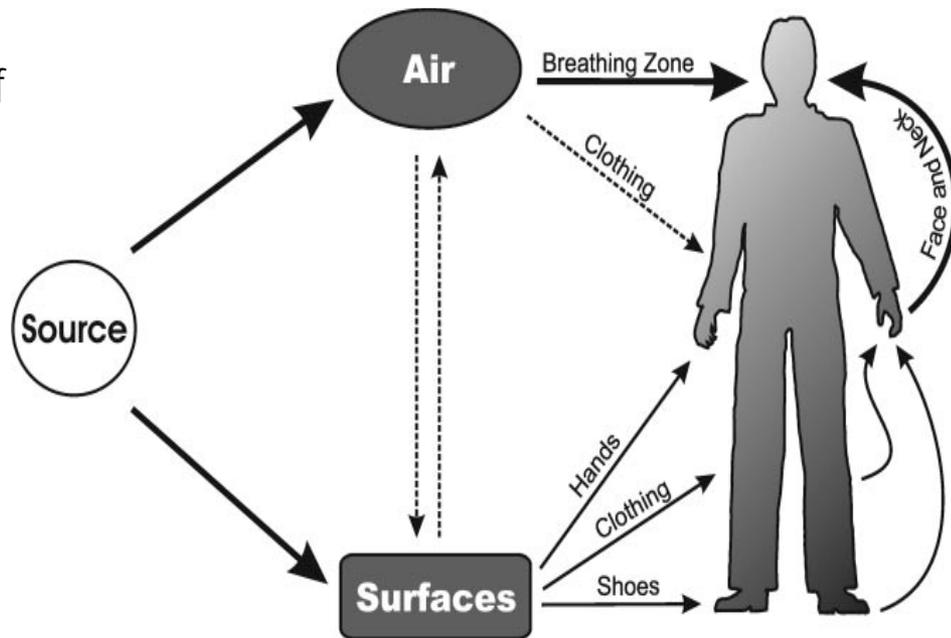


SEM of calcined BeO particles, by J. Fernback (Goldcamp et al., *JOEH* 2009)

Risks from Beryllium Exposure

Exposure to particles of beryllium metal, alloys, and oxide can lead to:

- **Beryllium Sensitization (BeS)**
 - Immune system response in percentage of those exposed
 - Detected by Be Lymphocyte Proliferation Test (BeLPT)
- **Chronic Beryllium Disease (CBD)**
 - Percentage of sensitized individuals
 - Particulate lodged in lung, cannot be expelled
 - Leads to lesions (granulomas)
 - Medically diagnosed (bronchioalveolar lavage)
 - Treatable but currently not curable

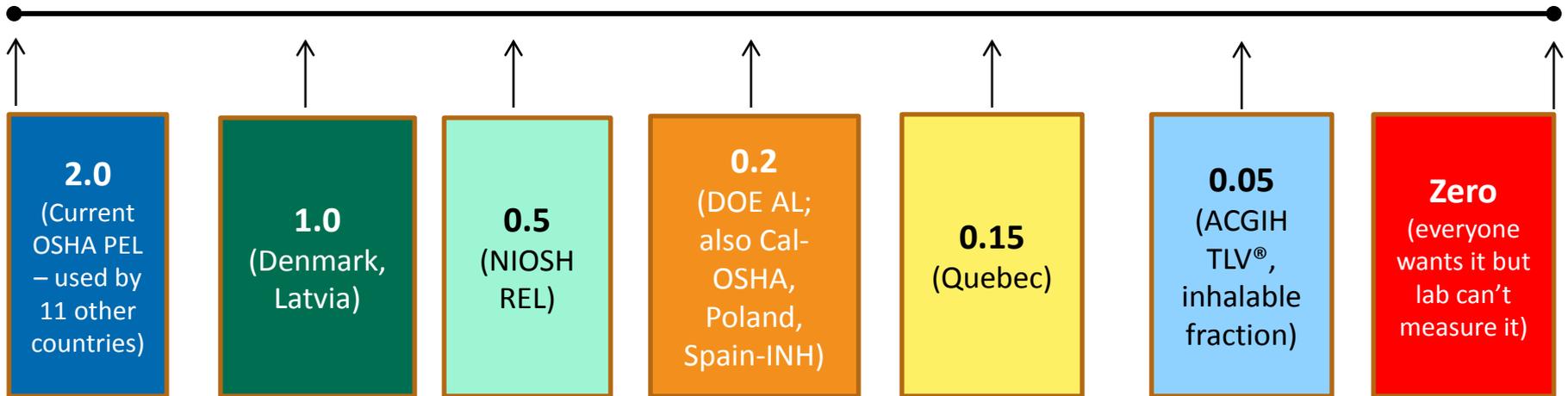


(schematic from G. Day et al., 2007)

Those who are not experts in beryllium health and safety may not fully grasp the distinction between BeS and CBD.

Current Range of Occupational Exposure Limits

(Values in micrograms per cubic meter)



OSHA – U.S. Occupational Safety and Health Administration
PEL – Permissible Exposure Limit
NIOSH – U.S. National Institute for Occupational Safety and Health
REL – Recommended Exposure Limit
AL – Action Level
INH – Inhalable Fraction
TLV – Threshold Limit Value

DOE also has a surface contamination limit (0.2 µg per 100 cm²)

Germany has been studying its Be OEL, which may be reduced (Nies, 2012).

The distinction between occupational exposure limits and action levels may not always be understood.



Why This Project Is Important – and Timely

- **Share Lessons Learned**
 - Help sites improve their programs before an external assessment occurs
- **JOWOG 30 Interest**
 - One of this year's projects for the beryllium focus group in JOWOG 30
- **Impending changes in OSHA and DOE regulations**
 - Good time to consider improvements while implementing new regulatory requirements



(beliefnet.com)

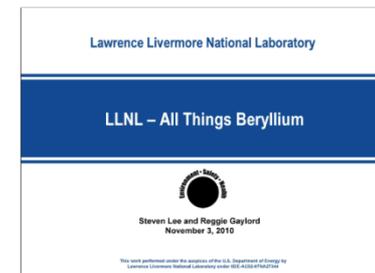


- **NNSA Independent Review – Fall 2008**
 - Followed unexpected change in medical surveillance trends and off-normal events (some of which pointed to work control issues)
 - 9 findings
 - 32 observations
 - Findings include: CBDPP document did not address several sections of the Rule, Baseline inventory was LTA, Communication was LTA, Conduct of IH was LTA, Conduct of assessments was LTA
- **In 18 months ending mid-2009, 12 occurrences or non-compliances across multiple facilities**
 - Poorly characterized legacy facilities
 - Having non-Be workers in Be Work Areas
 - Inadequate work control
 - Subcontractors exposed to un-identified hazards

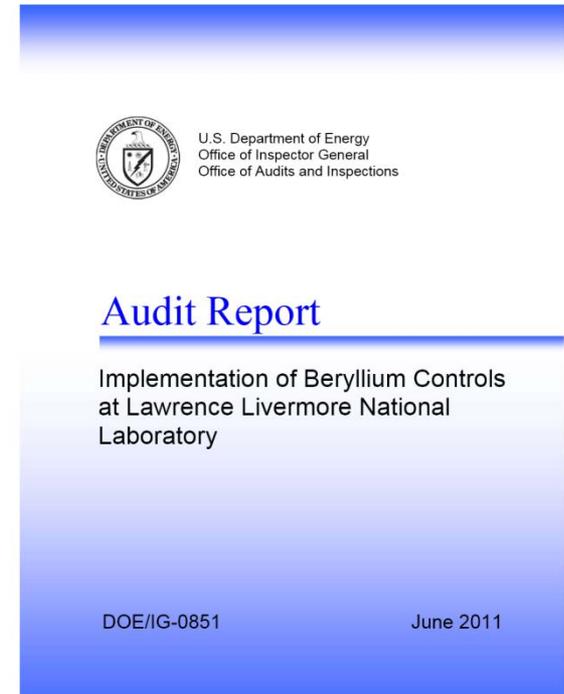
Lee and Gaylord, BHSC
Meeting, November 2010

HS4256 Beryllium Worker Training

Version 2.6.0 February 2010

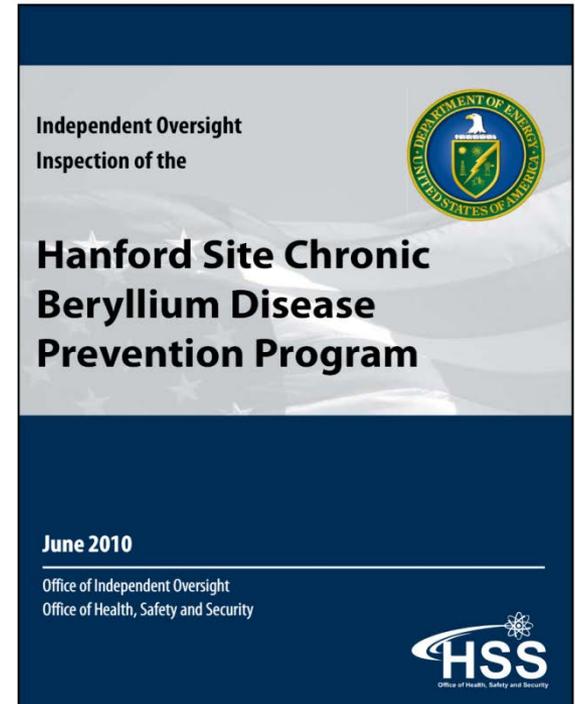


- **Corrective Action Plan – 125 actions**
 - Completed in 2012
 - Areas of focus included:
 - *Medical surveillance*
 - *Flow-down of requirements*
 - *Tracking and trending inadequacies*
 - *Improving formality of operations and conservatism*
- **Office of Enforcement Follow-Up Visit, July 2009**
 - Led to consent order - \$200,000
- **Inspector General Audit in 2011**
 - Acknowledged “significant effort” but some weaknesses remained
 - Verification and closure of corrective actions LTA
 - Livermore Site Office oversight LTA
 - Management did not agree with IG on some of these conclusions



Hanford Site - 2010

- **Independent Oversight Inspection of Hanford CBDPP – March/April 2010**
 - Report issued June 2010
- **Corrective Action Plan included 232 actions**
- **Four primary findings:**
 - Completion of contractor baseline beryllium inventory and hazard assessments (52 actions)
 - Beryllium-related training (25 actions)
 - Analysis of medical, job, and exposure data (26 actions)
 - Work planning and control (43 actions)
- **86 actions tied to OFIs**
- **Follow-up HSS review – April 2011**
 - Six follow-up recommendations



Information from presentation by Scott Seydel to BHSC at Fall 2010 meeting, the HSS report, and the Hanford CAP were used in this slide.

Hanford Site – Lessons Learned

- Regulatory compliance is not sufficient
- Some recommendations go well beyond the regulation
- Stakeholder involvement critical
- Good science is not sufficient
- Develop detailed implementation plans
- Consider the potential impacts of 10 CFR 851.25
 - “contractors must provide training and information to workers who have worker safety and health program responsibilities that is necessary for them to carry out those responsibilities”
- Engage outside experts



Requirements of 10 CFR 851, as well as 850, need to be considered.

- **Incident at Beryllium Test Facility – July 11, 2012**
 - Exceedance of DOE action level
 - Wet beryllium machining on a lathe
 - No respiratory protection due to self-contained exhaust system
 - Worker did his own personnel monitoring
- **OEO Enforcement Letter, May 29, 2013**
 - LANS did not use existing hazard assessment information to select appropriate controls
 - LANS did not establish a complete and accurate worker exposure assessment and control record
 - Sampling pumps out of calibration
 - Training of BTF personnel cited as LTA due to lack of full documentation
 - No penalties
- **Issues Identified by LANL:**
 - Formality of operations LTA
 - Perception that machinists are not qualified to perform safety and health functions

In this case, a single exceedance of the action level (not the PEL) ultimately led to an enforcement action.

Pacific Northwest National Laboratory – 2013-14

- Sep 2013 – Three Be milling machines removed from Radiochemical Process Lab (RPL) as excess
- Dec 2013 – Wipe samples from inaccessible surfaces exceeded action level
- Investigation showed that:
 - Routine Be sampling at RPL not done for several years
 - Work planning documents LTA
 - Some workers inadvertently dropped from Be surveillance program
- Resulted in consent order:
 - \$200,000 penalty
 - Corrective action plan (dated July 2014)
 - *Information on the CAP not available*



PNNL June 2010 Aerial View

- **When looking across DOE complex:**
 - Exposure monitoring programs are often called into question
 - The mere existence of any exceedances are seen as a program failure
 - Examinations of Be programs can lead assessors to look at non-Be exposures and find additional issues
 - *Many other exposures have not had as much time and attention focused on them as has been focused on Be*
- **Outside auditors can be very detail-oriented, but can also bring pressure that results in additional resources to solve issues**



BHSC/SAS Discussion – Common Themes

Themes from Apr 2015 discussion:

- Formality of operations
 - Work control documents
- Flow-down of requirements
- Address any exceedance aggressively
- Determine extent of condition in other non-beryllium areas

Additional thoughts from the author:

- Ensure that training, and documentation of training, are sufficient
- Ensure that hazard assessments are adequate
- Lowering of the PEL and the action level is likely to increase the number of exceedances
- Sites may need to do more, or more rigorous, self-assessments than they have been doing



Discussion – What Do You Think?

