



Beryllium Occupational Health Issues

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OEL issues (true etiology for standard setting?)

- Maintain exposures below the occupational exposure limit
- However, it appears –
 - Rates of sensitization and chronic beryllium disease (CBD) could be related to work areas where particle sizes are small
 - Total mass measurement of beryllium in air is a poor marker of biological risk of CBD



Occupational Exposure Limits (OEL) issues (true etiology for standard setting?)

- Putting together what is suspected so far:
 - Sensitization and CBD related to particle size and relative to surface area
 - Sensitization and CBD related to chemical form
- Is measuring total beryllium mass concentration obscuring the exposure-response relationship?
- Evaluating the relationship of particle size and CBD
 - Are we currently using an exposure standard with the wrong metric?



OEL issues (true etiology for standard setting?)

- Define a safe air concentration limit? “Not likely” (K. Kreiss, 2007)
 - Need to know physicochemical characteristics of the aerosols
 - Characterized by:
 - Chemistry
 - Size
 - Surface area
 - Solubility in body fluid compartments



Workplace Exposure Assessment Issues

- Current Occupational Exposure Limits (OELs)
 - Occupational Safety and Health Administration (OSHA) (29 CFR 1910.1000 Table Z-2)
 - 2 ug/m³ 8-Hour TWA
 - 5 ug/m³ Ceiling
 - 25 ug/m³ Acceptable Maximum Peak (30 Min)
 - National Institute for Occupational Safety and Health (NIOSH)
 - 0.5 ug/m³ any time
 - American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV)
 - **New!** 0.05 ug/m³ TWA Inhalable
 - Department of Energy (DoE 10 CFR 850)
 - 2 ug/m³ 8-Hour TWA with an Action Level of 0.2 ug/m³



Workplace Exposure Assessment Issues

- What OELs do the services use?
 - OSHA Permissible Exposure Limits (PELs) by law
 - Army, Air Force mainly the TLVs
 - Navy - OSHA but could suggest TLVs if supported by local resources



Impact of using new Threshold Limit Value (TLV)

- TLV mass currently under limit of quantification for current sampling and analytical methods to assess exposures.
- Need an increase of air volume sampled to get the Reporting Limit down to at least one half of the TLV.
- May require an increase in sample time (to gain necessary volume)
 - Reduces the ability to evaluate "transient" (short term) exposures or to determine the actual task that causes exposures.



Impact of using new TLV

- A change in the sampling and analysis methodology (inhalable) will most likely not be equated to previous airborne evaluations and exposure estimates of previously evaluated operations.
- Increase costs (Inhalable Sampler)
 - Management issues of sending the inhalable inserts to the lab with a needed protocol for appropriate cleaning and the ultimate return to the user



What are other agencies doing (DoE, NNSA)?

- National Nuclear Security Administration (NNSA) putting together a guidance document for non-beryllium work areas.
 - Includes surface wipe sampling. This effort may be cancelled.
- Department of Energy (DoE) looking at updating their rule.
 - DoE rule forces the responsibility of identifying Beryllium on the Safety and Health Community. This should be a Weapon System Program Manager responsibility.



Potential OSHA rulemaking issues

- OSHA rulemaking still on the agenda
- OSHA posed the question whether to adopt the DoE rule.
 - No!



Surface Contamination issues

- Recent research (proof of concept) that 1 micron particles can penetrate through the skin. If Beryllium particles present, there is a chance of sensitizing workers.
- Los Alamos incident – Surface contamination of a museum of Beryllium artifacts. They contacted over 2100 known visitors for follow-up



National Academy of Science, Committee on Toxicology Report

- Air Force funded study - Of special concern are the recommendations
 - Cannot define an appropriate OEL. This can be interpreted that if a beryllium exposure can be measured, it is an unacceptable risk. This would significantly increase the number of “workers exposed” regardless of actual risk.



The Genetic Information Nondiscrimination Act of 2008

- Genetic predisposition to become sensitized to Beryllium
- Regulations were to be promulgated by May 09. They are way behind.
- The law also prohibits most employers from using genetic information for hiring, firing, or promotion decisions, and for any decisions regarding terms of employment.



Beryllium Lymphocyte Proliferation Test

- A test to determine if an individual is sensitized to Beryllium.
 - Sensitized at work? Home? Previous job?
- Once declared positive for being sensitized, what will the employer need to do?
 - o Note 1 – 2 % positives are being seen of new hire workers who have never worked with it.



- **Uses of beryllium**

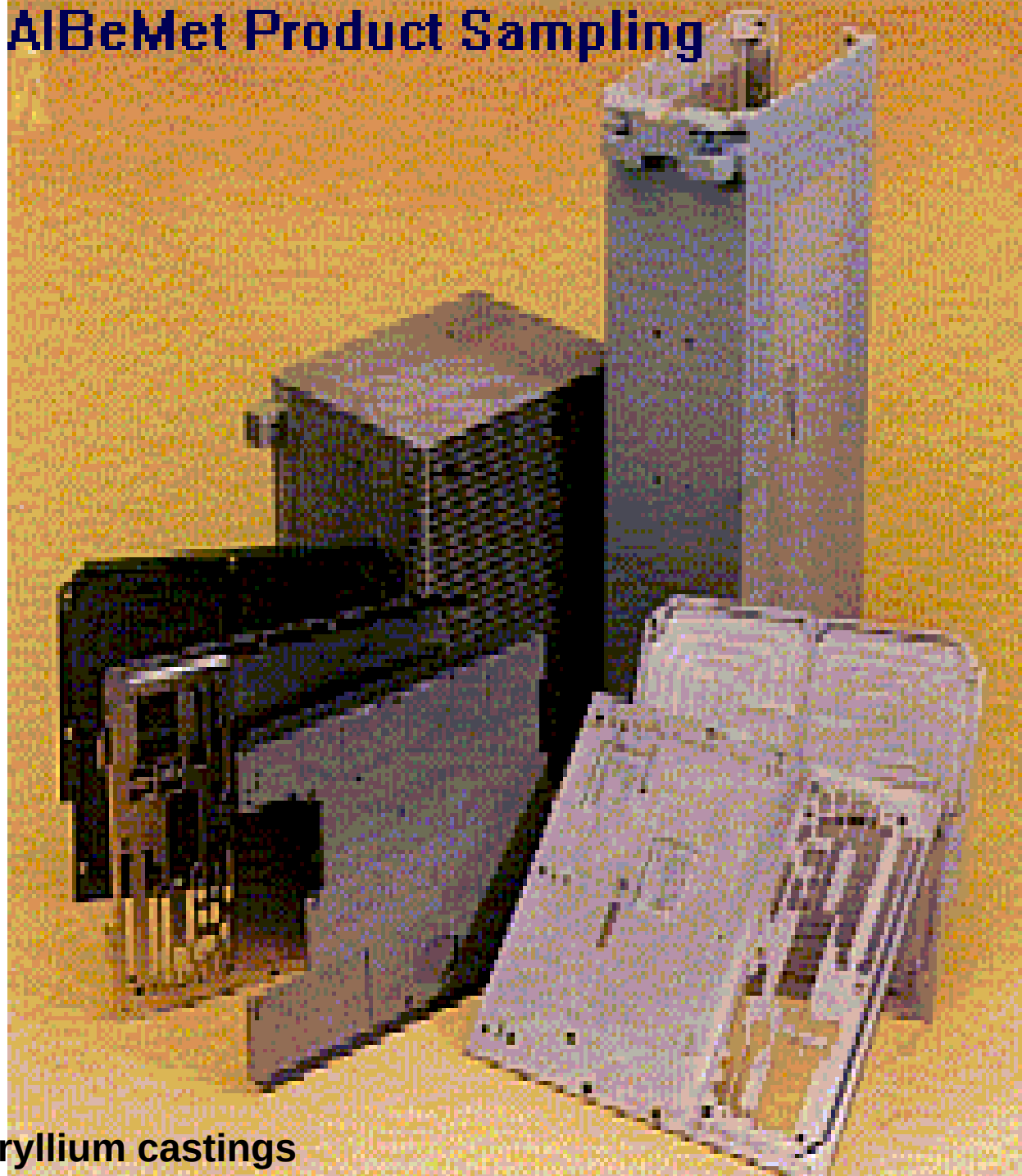


Aircraft landing gear bushings - Copper/Beryllium



Flight surface actuator bearings – Copper/Beryllium

AlBeMet Product Sampling



Aluminum/beryllium castings



Beryllium windows for X-ray/electron beam units



Early Capsule Heat shield



Military Ruggedized Lap Top Computer Case

**Copper/beryllium
Parts fabricated. Some
are in your
computer**



**Beryllium oxide ceramic
electronic parts. Beryllium
ceramics are good electrical
insulators and are very efficient
in transferring heat**



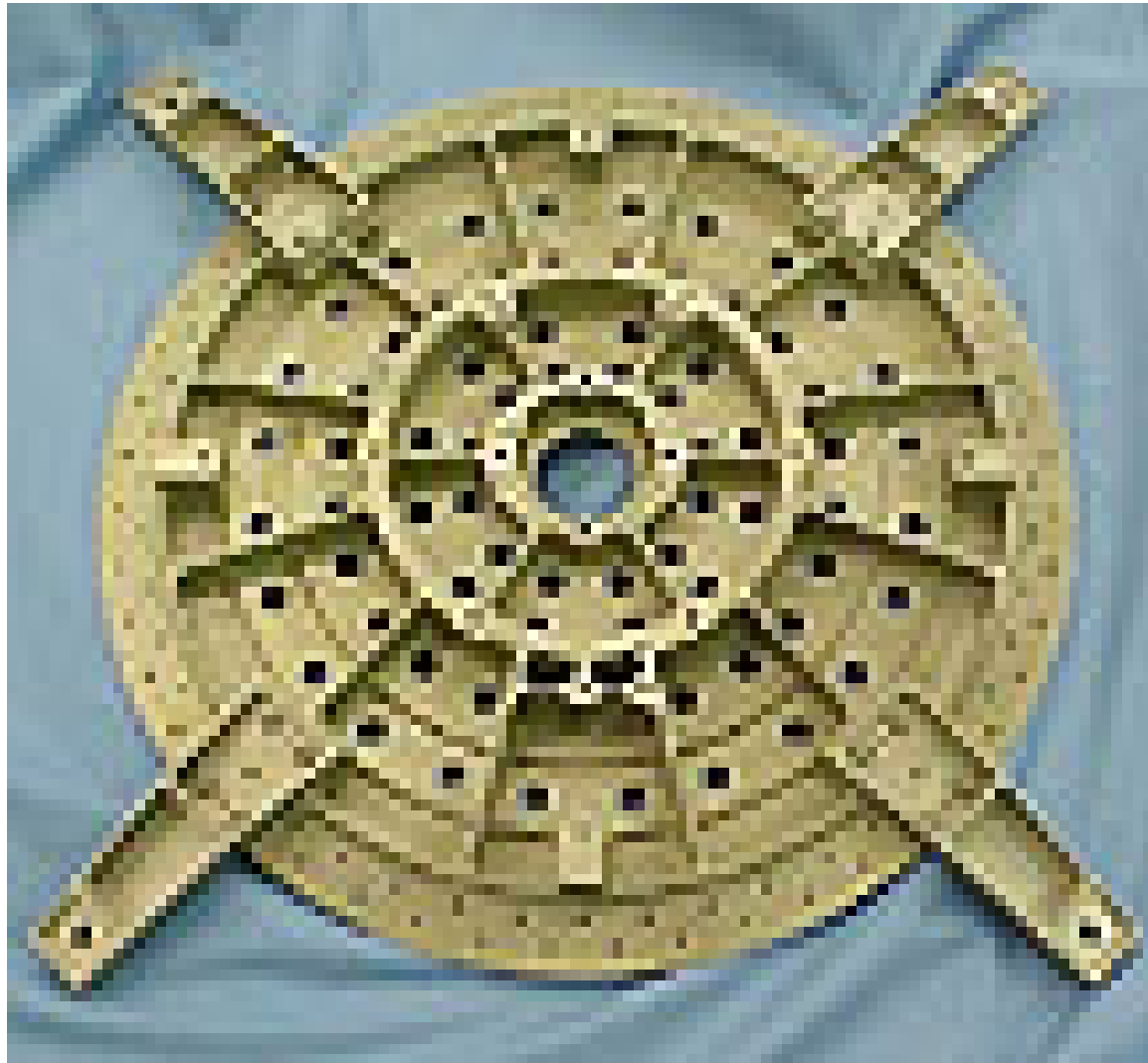




Molds to make plastic bottles



Electrical Spring Contacts



Antenna Strong back – Used for its light weight and dimensional stability



An emerald is a crystalline form of beryllium aluminum silicate

Discussion?

