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Jacqueline D. Rogers
Office of WS&H Policy
Office of E, H, S&S
U.S. Department of Energy
1000 Independence Ave, SW
Washington, D.C. 20585-0270

Dear Jacqueline Rogers:

RE: Department of Energy Request for Information (RFI) on Chronic Beryllium Disease Prevention Program dated December 23, 2010.

Pacific Northwest National Laboratory (PNNL) appreciates the opportunity to provide information to the Department of Energy (DOE) for your use in establishing new or revised requirements for the Chronic Beryllium Disease Prevention Program rule. As a National Laboratory, we perform a wide variety of research missions which have historically involved the limited use of beryllium in our facilities. PNNL conducted baseline facility characterizations in 1998 and 2000 and continues to perform ongoing surveillance and activity based sampling using wipe and personal breathing zone sampling for beryllium.

Background

PNNL's approach to controlling worker exposure to beryllium has been to identify and minimize the hazard to levels as low as practical. In 2010 alone, PNNL collected over 1300 samples for analysis of beryllium. It has been PNNL's policy to decontaminate beryllium-controlled areas normally occupied by staff to less than the public release limit after decontamination (verified through statistical post-cleanup sampling). These areas remain posted to warn workers of the potential residual hazards in generally inaccessible areas.

Decontamination efforts began in September 2002, and continue as new areas are identified. Characterization is performed using a detection limit of 0.0021 micrograms/sample to assure that we can detect levels below the public release limit. In addition, to historical areas initially identified as having the potential for beryllium contamination, PNNL is actively evaluating potential worker exposure from incidental contact with commercially available beryllium materials.

Comments

PNNL is pleased to offer the following comments on selected questions listed in the request for information.

Question 1: *The Department of Energy (DOE) currently defers to the Occupational Safety and Health Administration (OSHA) for establishing the permissible exposure limits (PELs) and uses an action level (AL) as the administrative level to assure that controls are implemented to prevent exposures from exceeding the permissible exposure limits. Should the Department continue to use the OSHA PEL?*

Response: PNNL recommends that the DOE continue to work with OSHA to update the existing PEL values which are currently under development. The development of the PEL must include considerations for short duration times that are typical of DOE and research activities where full shift work exposures over a working lifetime are not realistic risk estimates. PNNL currently uses an internal beryllium action level of 0.2 $\mu g/m^3$ for worker protection.

Question 2: *Should the Department use the 2010 American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV®) of 0.05 mcg/m3 (8-hr TWA of 0.05 micrograms of beryllium, in inhalable particulate matter, per cubic meter of air), for its allowable exposure limit?*

Response: PNNL does not recommend that the DOE adopt the 2010 ACGIH TLV® of 0.05 µg/m3 as an 8-hour TWA. The TLV®'s are based on worker lifetime full shift exposures which are generally considered to be safe for healthy workers. The very low exposure levels, short durations of exposures and respirable fraction of beryllium are much different in research and development applications than they are in other industrial settings.

The ACGIH TLV®s also are designed to be developed in concert with the TLV® & BEI's documentation which describes the limitations and qualifications to be considered using professional judgment by a qualified occupational health professional. Simply adopting the ACHGI TLV® as a surrogate for a PEL would not be using the values in the manner in which they were intended to be used.

Question 3: *Should an airborne action level that is different from the 2010 ACGIH TLV® for beryllium (8-hr TWA of 0.05 micrograms of beryllium, in inhalable particulate matter, per cubic meter of air), be established?*

Response: Please see response to question 1.

Question# 4: *In the past DOE encouraged, but did not require, the use of wet wipes rather than dry wipes for surface monitoring. DOE's experience with wipe testing leads the Department to consider requiring the use of wet wipes, unless the employer demonstrates that using wet wipes may cause an undesirable alteration of the surface, in order to achieve greater comparability of results across the DOE complex and in response to studies demonstrating that wet wipes capture more of the surface contamination than dry wipes. Should the department require the use of wet wipes?*

Response: Wet wiping allows for a greater collection of potential beryllium that may be on surfaces. In the instance when an area to be wiped is sampled and has significant material accumulation (e.g., more than one quarter inch of surface residuals present), it is more appropriate to take a bulk sample and compare to local soil background levels.

Question 5: *Since the use of wipe sampling is not a common occupational safety and health requirement, how do current wipe sampling protocols aid exposure assessments and the protection of beryllium workers? How reliable and accurate are current sampling and analytical methods for beryllium wipe samples?*

Response: Wipe sampling has proven to be very effective at identifying surface areas that may have the potential for beryllium contamination. This is an effective tool to make sure that the beryllium hasn't moved to a clean area, allows for the verification that where research activities involving beryllium in levels of ppm to ppt are not creating a larger footprint.

The use of surface wipe sampling to estimate potential airborne exposure depends on an estimated airborne release fraction (Mishima, Journal of Chemical Health and Safety, 2008) which are unique to virtually each source type of activity disturbance and type of contamination characteristics. Without science based correlation of beryllium surface contamination characteristics correlated with suspension factors and subsequent worker exposure and disease incident rates, the use of wipe samples as a surrogate for estimating beryllium exposure and disease potential, is of unknown validity. Using this information as part of a risk assessment assumes a correlation between surface contamination and exposure by air or skin uptake that has not simply been established and which results in extremely conservative decisions.

If wet wipes were required where extensive surface interferences are present, the 'mud' and sludge produced when sampling what is essentially a bulk material; do not necessarily result in more sensitivity for detecting beryllium. Due to dilution by the solid matrix and analytical interferences, the ability to obtain analytical sensitivity and accuracy are decreased.

Jofu, Mishima et al. Proposed Beryllium metal bounding airborne release fractions (ARFs)/rates (ARRs) and respirable fractions (RFs) for DOE facility accidents analyses. Journal of Chemical Health and Safety. Vol 15. Issue 4 Pages 26-45. 2008.

Question 6: *What is the best method for sampling and analyzing inhalable beryllium?*

Response: A variety of methods including IOM and cyclones, along with professional judgment applied to the specific situation, are essential. The method selected should be appropriate for the likely exposure scenario. Current methods require minimum sample volumes that are unrealistic for short duration, low exposure tasks.

Question 7: *How should total fraction exposure data be compared to inhalable fraction exposure measurements?*

Response: This question presumes a direct comparison is possible between the two which is not a simple analysis. This kind of comparison requires a consideration of a variety of factors specific to the beryllium contamination characteristics, the workplace exposure and the processes involved.

Question 8: *Should surface area action levels be established, or should DOE consider controlling the health risk of surface levels by establishing a low airborne action level that precludes beryllium settling out on surfaces, and administrative controls that prevent the buildup of beryllium on surfaces? If surface area action levels are established, what would be the DOE surface action*

level? If a low airborne exposure action level should be established in lieu of the surface area action level, what should the airborne action level be?

Response: The establishment of a surface action level would require knowledge of the relationship between surface contamination levels and worker exposure by inhalation. While it is obvious that there can be no exposure without the presence of beryllium, there is not a simple fixed relationship between surface contamination wipe measurements and air contamination concentrations of beryllium. Extensive wipe sampling has demonstrated a persistent natural or legacy background level of beryllium which is not reflected in air samples.

Question 9: *Should warning labels be required for the transfer, to either another DOE entity or to an entity to whom this rule does not apply, of items with surface areas that are free of removable surface levels of beryllium, but which may contain surface contamination that is inaccessible or has been sealed with hard-to-remove substances, e.g., paint?*

Response: No specific comment. The variables for requiring equipment labeling are too varied. A motor used in an area with known surface and airborne beryllium contamination should likely require a label at a minimum if the motor internals cannot be reliably evaluated. Labeling all equipment in a building that cannot be fully evaluated because one surface sample in one room indicated a beryllium level above the reporting level is not appropriate.

Question 10: *Should the Department establish both surface level and aggressive air sampling criteria (modeled after the U.S. Environmental Protection Agency's (EPA's) aggressive air sampling criteria to clear an area after asbestos abatement) for releasing areas in a facility, or should the Department consider establishing only the aggressive air sampling criteria?*

Response: DOE should not adopt aggressive air sampling criteria. Beryllium is often hard to get airborne without cutting, grinding, welding, etc. in which a large amount of energy is put into it. Aggressive sampling has been performed in buildings previously that were known areas of beryllium use, but the beryllium was not able to be moved off of the structural beams even though a large volume of air was being moved by multiple fans. This is not the best method for clearing a building.

Where elevated surface background concentrations are presumed to be present, aggressive air sampling criteria would potentially increase the worker exposure hazard. Adopting the commensurate controls such as those used for aggressive clearance sampling for asbestos contamination would substantially increase costs for building enclosures, additional personal protective equipment and labor. In addition, since the turbulent air volume has higher variability, the sample analytical costs would be 3-4 times higher since more samples would be required.

At PNNL, this would increase analytical costs for wipe sampling from $55,000/year to as much as $220,000/year. The additional costs of conducting the aggressive air sampling would add as much as $250,000/year. Without a valid basis for associating a specific risk with surface levels, the additional costs do not appear to provide a benefit in risk reduction.

Question 11: *Currently, after the site occupational medicine director has determined that a beryllium worker should be medically removed from exposure to beryllium, the worker must consent to the removal. Should the Department continue to require the worker's consent for medical removal, or require mandatory medical removal?*

> **Response:** A better definition by the medical community on what 'removal' means to protect the worker is needed in order to address this question. Until a better definition of what the risk, benefits and specific conditions of removal are, the current situation where worker consent is necessary should be continued. Further, mandatory removal may have significant and disparate impact on bargaining unit employees where management has less flexibility in finding alternate work opportunities for a removed worker.

Thank you for the opportunity to provide comments. Should you have any questions or require additional information, please contact Phil Bartley, Worker Safety & Health Programs Manager at 509-371-6732.

Sincerely,

Cameron M. Anderson
Director
Environment, Health, Safety & Security

CMA/MJS/crd

cc: Pam Aardal
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