



Regarding: **DOE, 10CFR 850 Chronic Beryllium Disease Prevention Program**

Docket Number: **HS-RM-10-CBDPP**

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Q2: Should the Department use the 2010 ACGIH threshold limit value (TLV) of 0.05 µg/m³ (8-hour time-weighted average of 0.05 microgram of beryllium, in inhalable particulate matter, per cubic meter of air), for its allowable exposure limit? Please explain your answer and provide evidence to support your answer.

A2: In many instances the argument against adopting the lower TLV (0.05µg or lower) is due to the lack of affordable analytical methods to reliably achieve these numbers. Commercially available optical fluorescence method (following NIOSH 7704 and ASTM D7202) is able to detect beryllium down to 0.005 µg with no added cost.

Q5: 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? Please explain your answers and provide evidence to support your answers.

A5: Analytical methods (NIOSH 9110 and ASTM D7202) using optical fluorescence are highly accurate and are beryllium specific. These methods have been validated¹ and the method detection limit (MDL) on wipes using specific commercial low-cost instruments has been shown to be as low as 0.00078 µg². In addition, optical fluorescence ASTM method D7458 has been developed for bulk sample analysis and has also been validated³.

Q6: What is the best method for sampling and analyzing inhalable beryllium? Please explain your answers and provide evidence to support your answers.

A6: The filters from the inhalers can be analyzed by fluorescence. MCE filters typically used on such inhalers using specific commercial low-cost instruments has been shown to provide an MDL of 0.00075 µg¹. The high sensitivity of the method will also allow these filters to be analyzed after an exposure over a short period of time (STEL).

Q8: 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 should be the DOE surface area

action levels? If a low airborne action level should be established in lieu of the surface area action level, what should that airborne action level be? What, if any, additional administrative controls to prevent the buildup on surfaces should be established? Please explain each of your answers and provide evidence to support your answers.

A8: Beryllium could be built up on surfaces and in general only show low amounts of beryllium in the air, its concentration in air may increase temporarily when subjected to air gusts and could pose danger to the workers. Thus in order to eliminate surface wipes, one may have to look at air sampling over short periods of time (STEL). However, as discussed in the answer to question 9, the availability of both the air and surface test methods is preferred.

Q10: Should the Department establish both surface level and aggressive air sampling criteria (modeled after the U.S. Environmental Protection Agency'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? Please explain your answers and provide evidence to support your answers.

A10: In legacy areas, the surfaces could be highly contaminated, but air may be relatively clean due to the absence of air currents. Equipment with such contaminated surfaces when taken into clean facility or moved has the potential to contaminate the surrounding air. This could also be the case, when a room is exposed to periodic gusts of air (such as opening of a door) which will cause more of the particles to be airborne. These spikes may not appear in air sampling for TLV, but could be harmful to the workers. Thus having both type of sampling provides a higher level of safety.

References

¹ Anoop Agrawal, John Cronin, Juan Tonazzi, T. Mark McCleskey, Deborah S. Ehler, Edel M. Minogue, Gary Whitney, Christopher Brink, Anthony K., Burrell, Benjamin Warner, Michael J. Goldcamp, Paul C. Schlect, Prerna Sonthalia and Kevin Ashley, *Validation of a Portable Fluorescence Method for the Measurement of Trace Beryllium in the Workplace Air and Wipe Samples*, Journal of Environmental Monitoring, **8**: 619-624 (2006).

² Ashley K, Agrawal A, Cronin J, Tonazzi J, McCleskey TM, Burrell AK and Ehler DS: Ultra-trace determination of beryllium in occupational hygiene samples by ammonium bifluoride extraction and fluorescence detection using hydroxybenzoquinoline sulfonate. *Anal. Chim. Acta* **584**: 281-286 (2007)

³ Cronin, J.; Agrawal, A.; Adams, L.; Tonazzi, J.; Brisson, M.; White, K.; Marlow, D.; Ashley, K. Interlaboratory evaluation of an extraction and fluorescence method for the determination of trace beryllium in soils. *Journal of Environmental Monitoring*, **10**, 955 - 960 (2008) DOI: 10.1039/b804313b.

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