Dear Ms. Rogers,

Enclosed below are my comments on the questions listed in Vol. 75, No. 246, page 80734 of the Federal Register dated December 23, 2010. The Docket Number is HS-RM-10-CBDPP and refers to the DOE Chronic Beryllium Disease Prevention Program (CBDPP). I am not an expert in industrial hygiene, however over the years I have been associated with reviews of contractor CBDPP activities, helped respond to concerns about beryllium exposures, and helped compile information for workers applying to the Energy Employee Occupational Injury Compensation Program Act (EEOICPA). Thank you for the opportunity to submit these comments and share my point of view.

Sincerely,

Richard L. Dickson, Certified Health Physicist

Comments on Issues Related to DOE's

Chronic Beryllium Disease Prevention Program

Docket No. HS-RM-10-CBDPP

(Federal Register Vol. 75, No. 246, December 23, 2010)

Question 1: Should DOE continue to use the OSHA PEL?

No. There is no compelling scientific or technical basis for continuing to use the OSHA PEL for beryllium. The OSHA PEL for beryllium was established over 40-years ago and is no longer technically or scientifically defensible. Since that time, the body of knowledge concerning the health risks associated with airborne exposure to beryllium has increased significantly. Unfortunately, OSHA does not have a program to periodically evaluate and revise the PELs so that they reflect the most-recent scientific knowledge about health risks to workers. Furthermore, there is no indication that OSHA will update the 40-year old PEL in the near future.

In 2008, the National Academy of Sciences published a report, Managing Health Effects of Beryllium Exposure. The report concluded that beryllium sensitization (BeS) and chronic beryllium disease (CBD) occurred in settings where airborne exposure was below the OSHA PEL. The committee wrote "… that it is not possible to estimate a chronic inhalation-exposure level that is likely to prevent BeS and CBD in settings where beryllium has the potential for being aerosolized. Existing medical-management programs designed to keep air, surface, and skin exposure as low as feasible have been successful in substantially reducing BES and CBD in various beryllium industries." The Department should consider this information in determining an appropriate course of action regarding its chronic beryllium disease prevention program.

An ethical discussion regarding the establishment of health standards for uranium miners is included in Chapter 12 (Observational Data Gathering – The Uranium Miners) of the Final Report of the Advisory Committee on Human Radiation Experiments. The discussion highlights the basic ethical responsibility of the federal government to take reasonable steps to protect and promote the health of workers. Ironically, in June of 1948, the Atomic Energy Commission established a tentative standard for permissible levels of exposure to beryllium, but failed to establish a standard for exposure to radon and its daughter products. The following excerpt from a section in Chapter 12 titled Conclusions About the Uranium Miners may help illuminate some of the difficult issues currently under discussion within the Department.

> The Advisory Committee concludes that an insufficient effort was made by the federal government to mitigate the hazard to uranium miners through early ventilation of the mines, and that as a result miners died. The Committee further concludes that there were no credible barriers to federal action. While national security clearly provided the context for uranium mining, our review of available records reveals no evidence that national security or related economic considerations were relied on by officials as a basis for not taking action to ventilate the mines. Since most of the mines were not ventilated, the federal government should at least have warned the miners of the risk of lung cancer they faced by working underground. We recognize that the miners had limited employment options and might have felt compelled to continue working in the mines, but the information should have been available to them. Had they been better informed, they could have sought help in publicizing the fact that working conditions in the mines were extremely hazardous, which might have resulted in some mines being ventilated earlier than they were.
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> The court in the Begay decision did not exaggerate when it called the abuse of these miners "a tragedy of the nuclear age."
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> The Committee believes that after 1951, when William Bale and John Harley's findings on radon daughters established that miners were getting a much larger dose to the lungs than previously suspected, the mine owners, the state governments, and the federal government each had a responsibility to take action leading to ventilation of all mines. There are basic ethical principles to not inflict harm and to promote the welfare of others (as described in chapter 4) under which all the relevant parties ought to have acted to prevent harm to the miners.
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> The Advisory Committee has found no plausible justification for the failure of the federal government, which is the focus of our inquiry, to adhere to these principles. It is clear that officials of the federal government were convinced by the early 1950s that radon and radon-daughter concentrations in the mines were high enough to cause lung cancer. The federal government's obligation flows from this knowledge and its causal link to the mining activity. Without the federal government to buy uranium, there would have been no uranium mining industry. Since the miners were put at risk by the federal government, a minimal moral

requirement would be that the government ensure that the risk was reduced to an acceptable level. Because the federal government did not take the necessary action, the product it purchased was at the price of hundreds of deaths.

The historical record is tangled and incomplete, but legal responsibility for the health and safety of the miners appears to have rested largely, but not exclusively, with the states. At the same time, the resources to implement remedial measures existed mainly within the federal government.

The complete text of Chapter 12, Observational Data Gathering – The Uranium Workers, is available at http://www.hss.energy.gov/HealthSafety/ohre/roadmap/achre/chap12_2.html.

Question 2: Should the Department use the 2010 ACGIH threshold limit value (TLV) of 0.05 $\mu g/m^3$ (8-hour time-weighted average of 0.05 micrograms of beryllium, in inhalable particulate matter, per cubic meter of air) for its allowable exposure limit?

Yes. However, the Department should not specify the 2010 edition of the ACGIH indices, but should use the TLV in ***the most recent edition*** of the ACGIH as its allowable exposure limit. DOE has a long history of using the more restrictive of the OSHA PEL or ACGIH TLV as the limit for worker exposures to chemicals and physical agents. Prior to the promulgation of 10 CFR 850 and 851, contractors were required by Attachment 2, Sec. 12.g of DOE Order 440.1, Chg 2 (10/21/96), Worker Protection Management for DOE Federal and Contractor Employees, to comply with the most recent edition of the ACGHI TLV for Chemical Substances and Physical Agents and Biological Exposure Indices, when ACGIH TLVs were lower (more protective) than OSHA PELs. Inconsistent with the long-held practice of using the most recent edition of the ACGIH indices, the promulgation of 10 CFR 850 explicitly linked the permissible exposure limit for DOE workers to the OSHA PEL of 2 $\mu g/m^3$ and created an action level what was then the 1998 ACGIH TLV of 0.2 $\mu g/m^3$.

Another internal inconsistency exists in Department practice, since the exposure limit established for DOE federal employees in section 4.m of DOE Order 440.1C, Worker Protection Management for DOE (including NNSA) Federal Employees, is not tied to the 2005 version of the ACGIH indices. The reference in DOE Order 440.1C is undated and is inferred to be the most recent edition (2010) where the ACGIH TLV is set at 0.005 $\mu g/m^3$. Accordingly, the current protection afforded federal employees from exposure to beryllium is greater than that afforded to contractor employees.

In contrast to OSHA practices, the ACGIH has an ongoing process for evaluating and updating the TLVs annually in response to recent scientific research and health studies. DOE has an ethical responsibility to ensure that the allowable exposure limit for airborne beryllium is based on the best available scientific and medical information, and not trapped in a 40-year old regulatory time warp.

Question 3: Should an airborne action level that is different from the 2010 ACGIH threshold limit value (TLV) of 0.05 $\mu g/m^3$ (8-hour time-weighted average of 0.05 micrograms of beryllium, in inhalable particulate matter, per cubic meter of air) be established? If so, what should be the level?

An airborne action level, at least a factor of 2 below the ACGIH TLV, should be established to help ensure that the TLV is not exceeded. This value takes into consideration the difficulty of reliably detecting beryllium at concentrations of 0.025 $\mu g/m^3$. Assuming a detection limit of 0.006 µg/sample, a flow rate of 2 L/min, and a sample time of 4 hours, the minimum detectable air concentration would be about 0.012 $\mu g/m^3$, which is about one-half of the proposed airborne action level. In this situation, reliably detecting beryllium at an action level of 0.025 $\mu g/m^3$ will be challenging.

An airborne action level allows a chronic beryllium disease prevention program (CBDPP) to implement reasonable administrative controls and hygiene practices to minimize the potential for airborne exposures. The airborne action level may be most effective when linked with the surface contamination action level. These action levels would trigger implementation of basic access controls (e.g., posting, labeling, and housekeeping), and work practices to minimize resuspension into the air and spread of contamination into adjacent work spaces.

Question 4: Should the Department require the use of wet wipes?

Yes. The Department should require the use of wet wipes. The intent of the wipe testing is to identify and control areas where airborne exposures to beryllium might occur. Use of dry-wipe techniques may not always pick up beryllium particles that could be resuspended from a surface. Wet wipes would provide a more efficient method for collecting and assessing the actual amount of removable contamination on a surface.

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?

Contrary to the point of view expressed by this question, wipe sampling is in fact commonly employed at Department facilities to control and prevent the spread of radiological contamination in the work place. Occupational radiation protection requirements for Department activities are specified in 10 CFR 835 and surface contamination values are specified in Appendix D.

The issue is not so much the reliability and accuracy of the wipe sampling methods to predict exposure, but rather the ability of wipe sampling to proactively identify work places where beryllium contamination is present and may become airborne. Resuspension of beryllium from contaminated surfaces is a major source of airborne beryllium in the work place. Wipe testing affords an opportunity to identify these potential areas of concern and implement controls to minimize airborne contamination. The suite of controls may include engineered controls (e.g., enhanced ventilation at the source), administrative controls (e.g., posting, labeling, access limitations, and PPE), and good hygiene practices (e.g., housekeeping and dust minimization, such as prohibition of broom sweeping).

The issues concerning reliability and accuracy of analytical methods used for beryllium wipe samples are no different than those encountered in obtaining good results for airborne

samples. Reliable chemical techniques for completely digesting the physical matrix in which the beryllium is present (e.g., ceramics, metals, oxides and dust) is paramount in order to ensure quantitative recovery and assay of the total beryllium in a sample.

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

I have no direct knowledge of the best analytical chemistry methods for analyzing inhalable beryllium.

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

The total fraction exposure data and the inhalable fraction exposure measurements are obtained using different sampling methods and are not comparable. Since there is no way of reliably predicting the consequences of differing physical parameters (e.g., particle size), a "correction factor" should be proposed in an attempt to compare results from the two techniques. The use of the inhalable fraction exposure measurement is specified for collecting samples to demonstrate compliance with the ACGIH TLV, and should be adopted by the Department.

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 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?

When consideration is made regarding the potential for a beryllium hazard to exist, a surface-area action level needs to be used rather than a low-airborne action level. In this context, the issue is not how much beryllium is present in the air at the time the sample is collected, but rather the potential for resuspending the contamination should the area be physically disturbed at some later time. An air sample collected in a highly contaminated room under quiescent conditions might show no detectable beryllium, however, by itself, such a sample would not provide an adequate basis for determining whether access to the area should be controlled or not.

The selection of an appropriate surface-area action level is largely an empirical exercise. The intent should be to pick an action level such that it would be unlikely for the air concentrations to exceed the TLV even under vigorous physical conditions that would disturb and resuspend the contamination. Early radiation protection standards for contamination were derived using resuspension factors (i.e., the ratio of the airborne concentration divided by the surface contamination level). The literature often references the work of H. J. Dunster (Health Physics, Vol 8, pp. 353-356, 1962 and A.E.R.E Report No HP/R.1495) and Chamberlain et. al. (AERE HP/R 737, 1951) as providing the technical basis for derived

surface contamination limits for alpha and beta emitters. A similar approach could be used to establish a surface-area action level for beryllium contamination.

Current Department regulations for occupational radiation protection (10 CFR 835) requires posting of Contamination Areas for transuranic alpha-emitting radionuclides when the surface contamination levels exceed 20 dpm/100 cm^2. The derived air concentration (DAC) for transuranic radionuclides (e.g., Pu-239 and Am-241) is 5×10^{-12} µCi/mL. As a rule of thumb, air concentrations in a Contamination Area are unlikely to exceed the DAC, except for very dusty operations such as grinding, sanding and welding. In this case, the ratio of the DAC divided by the surface contamination level (5×10^{-12} µCi/mL ÷ 20 dpm/100 cm^2) is 6×10^{-3}/m. Applying this factor and assuming a beryllium TLV of 0.05 µg/m^3, a derived surface contamination action level for beryllium would be on the order of 0.07 µg/m^2. While somewhat lower than the current removable contamination level of 0.2 µg/m^2, (10 CFR 850.31), the two values are still relatively comparable and suggest that the current removable contamination level is reasonable.

It's not clear that any administrative controls could prevent buildup of beryllium contamination on surfaces over a long period of time, although good housekeeping and cleaning practices will limit and minimize the rate at which buildup occurs. An additional necessary programmatic control is the collection of routine air and wipe samples in a beryllium contamination area to identify changing conditions, compromised engineered controls and buildup of contamination in the work place.

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?

Yes. Warning labels should be required for the transfer of items which may contain surface contamination that is inaccessible or has been sealed with hard-to-remove substances. The Department has an ethical obligation to inform the recipient of items and materials that may pose a health hazard. Otherwise, the recipient has no way of implementing actions to protect oneself and others from the potential hazards.

Question 10: Should the Department establish both surface level and aggressive air sampling criteria (modeled after the 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?

The Department should establish both surface level and aggressive air sampling criteria for releasing areas in a facility. The widely varying areas that will be encountered at Department facilities may make aggressive air sampling unreliable or difficult to conduct, especially for evaluating contamination in overhead areas. In any case, decontamination activities will need to have some initial goal for surface-area cleanup prior to conducting the aggressive air sampling prior to area release.

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?

This is a very difficult issue, since competing ethical values are present. Primarily, the question revolves around DOE's responsibility to protect worker health and the worker's right to self-determination. In this case, DOE's responsibility to protect worker health would be paramount, and worker consent should not be required for medical removal. While the worker may wish to continue to perform his job (even after developing sensitization to beryllium), the long-term liability for health issues continues to reside with DOE in the form of worker's compensation and the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). In order to lessen the potential impact on displaced workers, the Department may be able to offer either a job training program or hiring/placement preference in other comparable jobs that do not require continued exposure to airborne beryllium. DOE should be very careful not to compromise the doctor patient relationship, but should allow the doctor to act in the best health interests of the employee. Chapter 12 (Observational Data Gathering – The Uranium Miners) in the final report of the Advisory Committee on Human Radiation Experiments provides a compelling lesson learned that cautions against compromises that would alter the basic doctor-patient relationship and hinder the doctor from acting in the best health interests of an employee patient.

The complete text of Chapter 12, Observational Data Gathering – The Uranium Workers, is available at http://www.hss.energy.gov/HealthSafety/ohre/roadmap/achre/chap12_2.html.