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To: [Dayvault, Jalena \(Jalena.Dayvault@lm.doe.gov\)](#)
Cc: [Whited, Jeffrey](#); [Esh, David](#); [Smith, Theodore](#)
Subject: Follow up to call on January 11, 2017 regarding Durango Evaporation Pond removal project
Date: Thursday, January 12, 2017 12:07:01 PM

Good Morning Jalena

To followup to our call of January 11, 2017 and your letter dated November 7, 2016, responding to the U.S. Nuclear Regulatory Commission (NRC) staff comments on the U.S. Department of Energy (DOE) revised report entitled "Durango Transient Drainage System Closure and Evaporation Pond Removal Planning Documents" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16314E592) and the supplemental information provided by you via email on December 12, 2016. (ADAMS Accession Number ML16349A196) we offer the following observations:

- 1) The NRC staff was able to verify the result provided by the DOE staff for Radium-226 (Ra-226) of 0.018 millirem per year as the Radium Benchmark Dose (RBD) and the corresponding result provided for natural uranium (2787 picocuries per gram (pCi/g)).
- 2) The NRC staff was able to verify the DOE result provided for Thorium-230 (Th-230) of 33,000 pCi/g based on the information discussed on the January 11, 2017 teleconference, however the analysis appears to have used unjustified assumptions and inputs for the Durango site.

The summary report provided for the RESRAD evaluation of Th-230 shows a dose of 0.06 mrem/yr at year 0 of the simulation and a peak dose of 20.71 mrem/yr at year 187.5. DOE stated on the call that the year 0 value was used to derive the cleanup value because the cover will be maintained and have no erosion. The increase in dose from year 0 to year 187.5 is not solely attributed to erosion, but it is also due to ingrowth of Ra-226 and other isotopes during the 1,000 year timeframe required by the RBD approach.

In addition, the DOE analysis used unjustified values for the size of the site (area and depth of contamination), precipitation rate, irrigation rate, and other input parameters without providing a technical basis for the parameters used. In the analysis provided, the infiltration rate that is calculated in RESRAD is 0.5 m/yr, which does not appear to be appropriate for the Durango site. The impact of this high infiltration rate is that Ra-226 that results from the decay of Th-230 is inappropriately calculated to be flushed from the system. With an intact cover, all of the dose for the resident inspector scenario results from external radiation exposure and therefore doses are artificially lowered based on the high infiltration rate. If the infiltration rate is anticipated to be this high, then DOE should provide an evaluation of the potential doses to an offsite receptor and would need to use a different computational tool than RESRAD onsite.

- 3) The DOE staff indicated that they did not observe Th-230 during sampling at the Durango site, and that they would be using the U.S. Environmental Protection Agency's screening threshold of 540 milligram/kilogram (mg/kg) for uranium which is lower than the equivalent uranium value calculated using the RBD. This approach is acceptable, however, an acceptable technical basis for the Th-230 limit should be provided in the event that Th-230 is observed during future sampling. The Th-230

value of 33,000 pCi/g is not supported by the information provided to the NRC.

- 4) The DOE analysis did not follow the guidance provided in NUREG-1620 Appendix H. In particular, most of the parameter values used in the DOE's RESRAD analysis were default values. RESRAD default values may not be appropriate for RBD analysis. RBD analysis should use site-specific parameter values that are as realistic as possible. Specifically it would be useful if you would provide a technical basis for the following items:
 - a. The size of the contaminated area. It was set at 10,000 m² (the default value) when the actual site is much smaller.
 - b. The thickness of the contaminate zone. It was set at 0.15 m.
 - c. The precipitation rate. It was set at 1 m/yr which is too high for the Durango site.
 - d. The irrigation rate. It was set at 0.2 m/yr which is unrealistic for a resident inspector scenario and no future land use. The selection of a precipitation rate and irrigation rate should result in a calculated infiltration rate that is consistent with what has been observed at the Durango site.
 - e. Parameters associated with resuspension of contaminated soil, inhalation (e.g. soil mass loading), and environmental transport (distribution coefficients, wind speed, etc.). Technical basis for these parameters only needs to be provided if inhalation and ingestion pathways contribute to dose (i.e. there is a change to the assumed receptor or the assumption about no erosion of the cover).
 - f. Dose conversion factors. DOE used a custom set of dose conversion factors different from FGR or ICRP sets built into RESRAD without explaining how they were derived.

You indicated that you would be providing the NRC with a report on how the cleanup criteria were derived and in the report please provide a basis for the assumptions and input parameters used to derive the Th-230 cleanup criteria. Also, please consider these comments and re-run the RESRAD program using the input parameters as indicated above and provide the revised RESRAD sheets, and cleanup values to the NRC staff.

Please send the report etc. to Jeffery Whited, the new PM for the site and if you have any questions please feel free to contact me

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