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Evans, Robert

-----Original Message-----
From: Simmons, Michelle [mailto:Michelle.Simmons@nrc.gov]
Sent: Monday, April 06, 2015 9:30 AM
To: Bhat, Ramachandra K CIV USAF AFMSA (US)
Cc: Shaw, Daniel A Maj USAF AFMSA (US)
Subject: FW: Hill AFB DP RAI letter

Good Morning,

Please see the attached document. Thanks

From: Evans, Robert
Sent: Monday, April 06, 2015 8:10 AM
To: Simmons, Michelle
Cc: Cook, Jackie; Whitten, Jack; Kellar, Ray; Grossman, Christopher; Smith, James
Subject: Hill AFB DP RAI letter

Michelle-

Please forward the attached RAIs to the Air Force for their review and response.

I've formatted the document as an enclosure to a letter, but it can be easily converted to an email attachment.

Let me know if you have any questions.

Rob

NRC Request for Additional Information (RAI)
for Hill AFB DP, FSSP, EA, Work Plan, and QAPP

Decommissioning Plan

Section 1.0, Page 1-1

NRC reviewer requests copy of the site permit, UT-00517. Upon request by USAF, the reviewer will handle the permit as proprietary information.

Section 3.1.3, Page 3-2
Section 3.4.3, Page 3-10

Section 3.1.3 states that radium-226 concentrations in groundwater were less than 1 pCi/g. According to table 3-4, it appears that bismuth-214 and/or lead-214 were used as surrogates for radium-226, because radium is not listed in the table. However, the results for bismuth-214 and lead-214 were consistently above 1 pCi/g, ranging up to 85 pCi/g. Please clarify how you concluded that radium-226 concentrations in groundwater were less than 1 pCi/g. Further, please reconcile Section 3.1.3 with Section 3.4.3 which states that only thorium-230 was less than 1 pCi/g.

Also, the two sections appear to provide similar, but different discussions about detectable concentrations of radium-226, bismuth-214, and lead-214. Section 3.1.3 discusses bismuth-214 and lead-214, while Section 3.4.3 discusses radium-226. Perhaps it would be useful to clarify that the conclusions about radium-226 are based on the sample results for lead-214 and bismuth-214.

Table 3-4, Page 3 of 3

Sample results for well LM-063 are not provided; was this well sampled?
There are two sets of sample results in the table for Well LM-061-1; is this correct?
Note 9 does not mention well LM-063 suggesting that the well was not sampled.
The associated text (Section 3.1.3, Page 3-2) states that all 4 wells were sampled.
Please clarify whether well LM-063 was sampled and provide associated sample results.

Section 4.3.1, Page 4-6

To clarify, will the contractor develop and use conservative action levels for soil remediation work? This section indicates that the DCGLs will be the action levels. The ALARA analysis concludes that "the average residual contamination generally will be well below the DCGL", because of excess removal of soil instead of using conservatively set action levels.

Section 5.0, Page 5-1

The contractor plans to ship the packaged wastes to U.S. Ecology for disposal. According to U.S. Ecology's "NORM/TENORM Waste Addendum," the Grand View, Idaho facility can accept uranium and thorium wastes for disposal, if thorium-232 remains below 55 pCi/g and radium-226 remains below 50 pCi/g. The value for thorium-230 was not listed on the addendum. Do you plan to ship the wastes for disposal at the Grand View facility? What is the facility's acceptance limit for thorium-230?

Section 5.0, Page 5-3

Section 5 does not provide detailed discussion of site restoration activities. Consider adding Section 5.5, Site Restoration, or reference Section 4 of the Work Plan for detailed discussion of site restoration activities.

Sections 7.1, 7.5, 7.6, Pages 7-2 and 7-4

These sections state that "routine" surveys and monitoring will be conducted, but no details are provided. Please provide more information about the frequency, type, and location of sampling. For example, contamination control surveys for thorium-232 will be conducted weekly in offices, trailers, lunch rooms, etc. Alternatively, add a statement indicating that surveys and monitoring will be conducted in accordance with the contractor's implementing procedures or in accordance with the requirements provided in the Radiation Safety Plan (Appendix C to the Work Plan).

Section 7.9, Page 7-7
Section 10.7, Page 10-4
Work Plan, Section 5.2, Page 5-2

The minimum number of audits and program reviews should be clarified. Based on the available information in the various documents, there will be at least two radiation protection program reviews and two QA audits during the decommissioning project. Is this correct?

Section 7.9 specifies that a radiation safety program audit shall be conducted by the SSHO or designee. The SSHO is responsible for implementing the radiation safety program. Could the audit requirements be assigned to the corporate radiation safety officer? As noted below, the corporate radiation safety officer is required to conduct an audit during the final status survey.

Additional audit requirements are specified in Section 10.7. Section 10.7 specifies the QA program audits, conducted to ensure that decommissioning activities are being conducted in accordance with DP requirements. These audits are conducted at least quarterly.

Section 5.2 of the Work Plan describes the audit requirements for the final status survey. This section indicates that two audits will be conducted, one by the QA group and the second by the corporate radiation safety officer.

Section 7.9.1, Page 7-8, 5th Bullet

This section indicates that the worker contamination limits are the same as the equipment/surface contamination limits. Is this correct? As a comparison, the Radiation Safety Plan, Appendix C to the Work Plan, states that the action level for personnel frisking is twice background (see Table 6-3).

Which limits (removable, fixed average, fixed maximum) apply to workers, and which radionuclide will be used as the action level (thorium-232 or radium-226)?

Alternatively, instead of referencing Table 7-1 of the DP, consider changing the bullet to refer to Table 6-3 of the Radiation Safety Plan.

Section 8.1, Page 8-1, Second and third paragraphs

This section describes the general area air sampler requirements for effluent monitoring. Will these be the same samplers and locations as discussed in Section 7.2 for general area air samplers? What is the minimum number of samplers to be in service at a time?

The third paragraph provides a statement that a "portion" of the samples will be sent to an offsite laboratory for confirmatory analysis. Please clarify what is meant by a portion (5-percent?) and what the laboratory will confirm (that is, an isotopic analysis?)

Section 9.1, Page 9-1

Please clarify how the contaminated soil will be packaged and transported to the disposal site. Section 9.1 states that the contaminated soil will be "packaged into U.S. Department of Transportation compliant containers for transport....Packaged waste will be staged while awaiting transport." This section suggests that boxes or super-sacks will be used as packages for transport, similar to previous excavation work conducted at Kirtland AFB. However, Section 4.3.2 of the Work Plan (page 4-10) states that "dump trucks will be provided to transport low activity radiological waste soils offsite to the disposal site."

Which method (boxes, sacks, or dump trucks) will be used as the package for the contaminated soils? If using boxes or sacks, how will the packages be moved to the disposal site (e.g., intermodal, flat-bed truck)? If dump trucks are used, will covers be installed over the bed of the truck?

Final Status Survey Plan

Step 3.6, Page 3-5

This section states that 5% of samples will be replicate/split samples. However, Section 4.2 (page 4-3) mentions 10% while Section 8.3 (page 8-3) also mentions 5%. Are these three sections referring to the same samples? As another reference point, QAPP Worksheet 20 lists 10% for field duplicates. Please confirm the desired % for duplicate sampling.

Section 7.0, Pages 7-1 through 7-2

This section discusses the use of the net sum of ratios (net SOR). What is the reference for this equation, because it does not appear to originate from MARSSIM (NUREG-1575)? What other NRC or industry standard references and endorses the net SOR methodology?

Environmental Assessment

The USAF's memo dated 12 Sept 14 states that the AF will ask two tribes to confirm that no sites of religious and cultural significance are within the perimeter of the LMTA and will inform the NRC of any responses. What is the status of this commitment? This information is necessary for the NRC's development of an EA.

Page 27 of the EA provides a contamination summary map. The WR111 site falls within the shaded area, suggesting that the site may have the potential for contamination of shallow groundwater. This issue is not discussed in the EA or DP.

- What is the potential contamination, that is, is the contamination radioactive or some other hazardous material?

- Was the area designated as contaminated before or after the 2006 groundwater sampling within WR111?
- Were the soil samples collected in WR111 sufficient to test for this contaminant?
- Perhaps the DP should be updated to explain why this contamination survey map is not applicable to the WR111 site

Page 37 of the EA mentions the Hill AFB Integrated Natural Resources Management Plan. Will this plan be implemented after the completion of work at WR111? Similar to the earlier comment about site restoration (proposed Section 5.5 of DP), the DP should be updated to state if this Management Plan will or will not be implemented at the WR111 site after completion of site activities.

Work Plan

Section 2.2, Page 2-1

Please provide ground-level photos of the site to supplement Section 2.2 of the work plan. All photos are aerial photos that do not provide ground-level views of site terrain.

Section 3.3, Pages 3-1, 3-2

This section discusses cleanup goals. As a clarification, the cleanup goals (action levels?) are the wide-range DCGLs, and site specific action levels will not be developed? (This comment is similar to the DP Section 4.3.1, Page 4-6 comment listed above.)

Quality Assurance Project Plan

QAPP Worksheet 17, page WS17-1

The last bullet lists a sampling frequency of one soil sample every 500 cubic yards of offsite borrow material. How does this frequency compare to the sampling frequency specified in Section 4.5, Page 4-12, of the Work Plan? The work plan lists a sampling frequency of 1/1000 and 1/2000 versus 1/500.

Appendix C to DP, Site-Specific Derived Concentration Guideline Level Evaluation

To summarize, there are four in total. The first RAI addresses the adequacy of the site conceptual model used in the modeling given site characterization data. The second addresses the rationale for screening the drinking water pathway. The third RAI addresses the limited technical basis provided by the licensee for influential parameter values including erosion rates, external exposure pathway parameters, and partition coefficients. The final RAI focuses on concerns regarding the licensee's rationale provided for age-weighting the plant consumption factors

RAI-1

The licensee should provide a justification for the conceptual model used to determine site-specific DCGLs is adequate.

Basis:

The licensee's conceptual model, described in Section 4.2.1 and Appendix C, Section 3.2, of the Decommissioning Plan, assumes that residual radioactivity remaining after remediation will be limited to a depth interval of 10-20 feet (3-6 meters) below grade surface and that the overlying soil will be free of residual radioactivity. The conceptual model assumes that the areal extent of the residual radioactivity will include the entire WR111 site, which is approximately 60,500 square feet (5,620 square meters).

To identify areas of impacted soils, the licensee compares site characterization data to site-specific soil screening values (SSVs). To calculate the SSVs, the licensee summed the mean background soil concentrations and NRC surface screening values[1] for each radionuclide of concern[2].

From this comparison, the licensee identifies a number of sampling locations at which soil concentrations exceed the SSVs for an individual radionuclide of concern or the sum of fractions (i.e., ratios of soil concentrations to SSVs) exceeds unity. From this comparison, the licensee identifies two regions of impacted soils in the east-central and southern portions of the site that would be excavated and replaced with clean fill. The areal extents of these regions to be excavated are reportedly 4,500 and 4,100 square feet [420 and 380 square meters], respectively.

Soil concentrations that exceeded the SSVs are predominantly located within the licensee's proposed excavation area; however, a number of surface soil samples outside the proposed excavation area also exceeded an SSV[3], suggesting that areas outside of the areas identified for excavation may also contain residual radioactivity. Because the characterization data suggests that residual radioactivity exceeding background levels is present, the conceptual model of clean soil that is free of residual radioactivity overlaying a layer of subsurface residual radioactivity for developing DCGLs may not be appropriate for the final site configuration. Residual radioactivity may remain in the portions of the site outside the planned excavation areas if the soil concentration at a particular location is less than the sum of background and the DCGLs.

Further, the NRC surface screening values, which were added to background to develop SSVs, correspond to a dose of 25 mrem/yr (0.25 mSv/yr) when applicable for a given site. It does not appear that the licensee's conceptual model has adequately accounted for exposures from surficial residual radioactivity that would remain outside the planned excavation zones in developing the site-specific DCGLs.

In addition, the licensee has indicated that the backfill may include excavated soils from the periphery of the excavation with residual radioactivity concentrations that are below the DCGLs, which is not consistent with the conceptual model. The significance of this specific inconsistency is expected to be dependent upon the volume of backfill that originated from the excavation and the residual radioactivity concentrations in the reused backfill soil.

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[1] NRC surface soil screening values can be found in Table H.2 of NUREG-1757, Volume 2.

[2] Background soil concentrations were not determined for Th-230. Therefore, the licensee simply used the NRC screening value for this radionuclide.

[3] A comparison of Figures 3-1 and 3-3 to Figure 5-1 from the Decommissioning Plan indicates the following surface soil samples locations outside the planned excavation area that exceeded an SSV: RSS-02, RSS-05, RSS-06, RSS-07, RSS-11, RSS-13, RSS-14, RSS-19, RSS-25, RSB-13 (subsurface), WR714, and WR715.

Path Forward:

The licensee should provide a technical basis that justifies the conceptual model used for to develop the DCGLs that is consistent with site conditions or demonstrates that the current conceptual model adequately accounts for the impacts from expected site conditions.

RAI-2

The licensee should provide support for removing the drinking water pathway in the conceptual model for the development of DCGLs.

Basis:

The licensee indicates in Appendix C, Section 3.2, of the Decommissioning Plan that the drinking water pathway is not considered for the resident farmer scenario because (i) existing groundwater data indicate no presence of residual radioactivity in the groundwater, (ii) thorium has low mobility, (iii) impacted soils are separated from the groundwater table, and (iv) the bedrock layer apparently has a low permeability. The drinking water pathway may be an important contributor depending on the values of site-specific physical parameters associated with the exposure pathway (e.g., distribution coefficients and saturated zone properties).

NUREG-1757, Appendix I, recommends that removal of waterborne pathways should be based on physical conditions. The apparent lack of existing groundwater contamination and low contaminant mobility is generally not acceptable for removing waterborne pathways from the modeling for determining DCGLs. Reasonable physical conditions generally include water quality or groundwater yields. Section I.3.3.3.2 of NUREG-1757, Volume 2, Appendix I, provides guidance on the technical basis for removing waterborne exposure pathways. Low permeability in the bedrock may corroborate the removal of the drinking water pathway from the modeling, but the licensee does not appear to have provided data to support the assertion.

Path Forward:

The licensee should provide an improved technical basis that adequately justifies removal of the drinking water pathway. The technical basis could include site-specific data to demonstrate that water quality or groundwater yields are not adequate for drinking water consumption.

RAI-3

The licensee should provide a technical basis for parameters that significantly influence the DCGLs, including, in particular, erosion rates, occupancy factors, ingestion pathway factors, and partition coefficients.

Basis:

Section 4 and Appendix C of the Decommissioning Plan details the development of site-specific parameters for the RESRAD modelling used to develop the DCGLs. For the

residential farmer scenario, which is the scenario the DCGLs were derived from, the input values are listed in Attachment A of Appendix C. Attachment A also includes comments on the particular value selected by the licensee for each parameter. However, for many influential parameters, which are described further in the following paragraph, limited justification is provided for the value selected.

The important exposure pathways for the radionuclides of concern (i.e., Ra-226, Th-230, and Th-232) in the licensee's RESRAD modeling are the external and water-independent plant exposure pathways. Given the significance of these pathways in the licensee's modeling, RESRAD (i) erosion rates, (ii) occupancy, inhalation, and external gamma parameters (namely the external gamma shielding factor and outdoor time fraction), (iii) ingestion pathway parameters (namely plant consumption rates), and (iv) radionuclide partition coefficients are expected to be among the more influential parameters in determining a DCGL. While the licensee has provided a justification for modification of the plant consumption rates, NRC staff note questions regarding the adequacy of the licensee's approach in another request for additional information.

For site-specific analyses, NUREG-1757, Vol. 2, Appendix I states that the licensee should provide justification for using the default RESRAD parameters, along with any justification for site-specific modifications. For the parameters being represented by constant values, NUREG-1757, Vol. 2, recommends that the licensee provide the range of appropriate values for the parameter, the single value selected for the parameter, and the basis for the range and selected value, including references. The level of justification to be provided in the basis should be based on the classification of the parameter (i.e., behavioral, metabolic or physical) and the relative significance of the parameter in the dose assessment.

For influential input parameters classified as "behavioral" or "metabolic," the licensee could specify values that are consistent with the default screening values specified for the DandD code behavioral and metabolic parameters with limited justification, as long as the definition of the critical group has not been modified or provide an adequate basis for site-specific values selected that reflects the importance of the particular parameter and the relevant site-specific conditions. The licensee should refer to NUREG/CR-5512, Volume 3 for the set of default screening values specified for DandD code behavioral and metabolic parameters.

For influential input parameters classified as "physical", the licensee should use site-specific values whenever available. However, for geochemical parameters, such as partition coefficients, the licensee may rely on RESRAD code default probabilistic distribution ranges, as long as justification is provided to demonstrate that the ranges are consistent with geochemical conditions at the site. Site conditions may require that the licensee modify the default parameters to ensure consistency.

Path Forward:

The licensee should provide an adequate basis for each input parameter used in the residential farmer scenario that influences the DCGLs, including soil erosion rates, plant consumption factors, external pathway parameters, and partition coefficients that is consistent with NRC guidance.

RAI-4

The licensee should provide a technical basis for weighting the consumption rates for fruits, vegetables, and grains and leafy vegetables.

Basis:

An important exposure pathway for the radionuclides of concern (i.e., Ra-226, Th-230, and Th-232) in the licensee's RESRAD modeling is the water-independent plant exposure pathway. Given the significance of this pathway, plant consumption rates are expected to be influential in determining a DCGL. In determining site-specific consumption rates, the licensee provided a detailed calculation in which the licensee weights the consumption rates for differing age groups. Specifically, the licensee weights the exposure duration (i.e., 30 years) by the time spent as a child (i.e., 6 years) and as an adult (i.e., 24 years).

While the licensee's approach may be appropriate for lifetime risk estimation, the approach is generally not appropriate for determining DCGLs because NRC's dose standard is an annual, rather than lifetime, dose to an average member of a critical group. The licensee's age-weighted approach also results in an inconsistency in the dose modeling because the dose conversion factors that convert concentrations to doses are not age-weighted but are based on an adult. Section 5 of NUREG-1757, Volume 2, indicates that for most multiple pathway scenarios, the average member of the critical group should usually be assumed to be an adult with the proper habits and characteristics of an adult.

The practical effect of the licensee's age-weighting was to lower the consumption rates from those typically relied upon for an adult. NUREG-1757, Volume 2, Appendix I states that the licensee may use default values for the behavioral and metabolic parameters, with limited justification, if the values are consistent with the generic definition of the average member of the critical group, and the screening group is reflective of the scenario. Section I.6.3.4 of NUREG-1757, Volume 2, Appendix I, also indicates, however, that as a set, the RESRAD default parameter values are generally *not* considered to be acceptable default input parameter values for performing dose assessments in support of decommissioning. Instead, a licensee may use the RESRAD default probabilistic distribution parameter set described in the preceding section as a starting point for its analyses.

For the parameters being represented by constant values, the licensee should provide the range of appropriate values for the parameter, the single value selected for the parameter, and the basis for the range and selected value, including references. The level of justification to be provided in the basis should be based on the classification of the parameter (i.e., behavioral, metabolic or physical) and the relative significance of the parameter in the dose assessment. For input parameters classified as "behavioral" or "metabolic," the licensee should specify values that are consistent with the default screening values specified for the DandD code behavioral and metabolic parameters, such as consumption rates, as long as the definition of the critical group has not been modified, or provide an adequate basis for site-specific values. The licensee should refer to NUREG/CR-5512, Volume 3 for the set of default screening values specified for DandD behavioral and metabolic parameters.

Path Forward:

The licensee should provide a technical basis for the plant consumption rates that is consistent with the resident farmer scenario, determination of DCGLs, and NRC guidance.