

***Overall Comments on Request for Additional Alternate Disposal Approval and Exemptions for Specific Hematite Decommissioning Project Waste at US Ecology Idaho***

The licensee needs to provide a clear discussion of quantifiable objectives followed by the demonstration of if and how characterization activities achieved those goals. This would include the number of statistical samples required per population; the method for demonstrating criteria are satisfied; the basis for the use of surrogates; spatial boundaries associated with each population; the relationship between area, facility, and sample location; the rationale for use of historical data in decisions, etc.

A formal characterization plan should be prepared for the waste materials. In some cases, historical data may be acceptable for use. However, there are numerous data gaps that should require additional investigations and sampling. For example, when looking at Appendix D Figure 1 and Table 1, it is apparent that the sampling was primarily biased, concentrating on locations of elevated direct radiation and cracks/joints in the floor. The majority of the surface has not been characterized by sampling. Data provided in Table 6.3 also seem to suggest that Tc-99 contamination is present outside of the identified elevated uranium areas. These issues are further exasperated by the fact that there is no indication that alpha-beta scans were performed to further evaluate surface contamination levels on those portions of the slab that have not had contamination covered by resurfacing. Such scans would confirm if there are other anomalous regions with significant Tc-99 contamination and/or uranium. The identified contaminated areas have been extensively sampled. It is recommended that additional systematic probabilistic samples, based on the DQO process be developed and implemented for the remainder of the slab and combined with documented alpha-beta surface scans.

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RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
1	HEM-12-2 Section 5.2 and TBD-WM-906 Section 8.1	Waste characterization plan for "additional equipment which may be identified as candidate material for USEI" is not provided.	10CFR20.2002(a)	<p>Section 5.2 discusses examples of miscellaneous equipment being identified as candidate material. An example was the water treatment equipment. The section further indicates these materials would receive HP surveys, which could be interpreted to mean just direct surface activity measurements. The statement is made that the results of these surveys will be used to determine the radionuclide inventory. Overall, the discussion is very vague as to the requirements for adequately characterizing these materials for shipment. The commitments made in Section 5.2, although vague, are then further confounded in Attachment 1, as Section 8.1 states that for HEPA units scaling factors were used for Tc-99 and U-235 based on gamma radiation levels and MCNP. It is noted</p>	<p>Is characterization of miscellaneous equipment planned?</p> <p>Clarifying information should be provided for the processes used to characterize miscellaneous equipment and for quantifying the radionuclide-specific inventory.</p>

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				in the final sentence that <u>no additional characterization of this miscellaneous equipment is planned.</u>	
2	HEM-12-2 Section 5.2.2	There is an issue with the additional characterization batching and analytical approach for piping.	10CFR20.2002(a)	The context that batching is used here appears similar to the concept of survey units or survey populations. The type of survey, required number of samples, and related data quality batches generally infer the batched population is similar in type or historical use of the material. However the batching description discusses using the railroad car as the designator. This would be appropriate if the data were being collected to ensure dosimetric conditions, discussed in later sections, were being met, but may not be appropriate for gathering characterization data. The potential for dissimilar piping being batched then leads to additional concerns as to whether the use of gamma spectrometry to quantify enriched uranium quantities is appropriate without specific further details as to	<p>Provide further justification as to appropriateness of batching characterization populations based on railcar lots and for using gamma spectroscopy for total uranium determination.</p> <p>Provide details on the processes used to characterize piping and for quantifying the radionuclide-specific inventory.</p> <p>Clarify how scaling factors will be used in piping analyses and whether or not a comparison of the U-235 to U-238 concentration will be made along with a subsequent enrichment estimate from which the multiplier will be determined.</p>

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				how the U-234 contribution to the total uranium concentrations will be calculated. Are the isotopic abundances consistent enough where a single scaling factor will be used or will a comparison of the U-235 to U-238 concentration be made with a subsequent enrichment estimate from which the multiplier will be determined?	
3	TBD-WM-906 Section 6.4, Tables 6-2 and 6-3	It is not clear how the values in Table 6-2 and Table 6-3 were determined, or which area each result represents.	10CFR20.2002(a)	<p>It is noted in Section 6.4 of the TBD that Tables 6-2 and 6-3 provide details on the calculation of the two activity components for both elevated areas and areas not in the “six identified areas.” It is not clear which data are calculated using a scaling factor or other indirect method and which data are from actual radionuclide specific sampling results.</p> <p>It is not clear how these samples are organized, and the origin of each result. As presented, the reviewer is left to assume each table represents a single</p>	<p>Provide details on how each data set was determined and whether or not actual sampling results were used for each nuclide.</p> <p>Add columns to show relationships with buildings, areas, and any other appropriate subdivision.</p>

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				population. Figure 1 in Appendix D suggests the samples can be divided into building footprints (potential population) and elevated area (potential subpopulations).	
4	TBD-WM-906 Section 6.4	Attachment 1, Section 6.4 provides the discussion of the gamma walkover but no indications of additional surveys for alpha-beta surveys. Table 6.3 shows Tc-99 contamination present outside the 6 "identified" areas.	10CFR20.2002(a)	The gamma walkover surveys were appropriate for identifying high levels of enriched uranium contamination that had been covered by a concrete cap. However, additional alpha-beta surveys should also have been performed to have identified Tc-99 or lower level contamination on uncapped floors if a contaminating event occurred after the cap was placed. The data shown in Table 6.3 provide evidence that Tc-99 contamination is present outside the uranium "identified" areas and substantiates the need to perform surveys capable of identifying Tc-99.	This RAI is essentially a companion to the previous comments indicating that a formal characterization plan should be developed. The recommended path forward is to perform and document these recommended surveys and determine the need for judgmental sampling of suspect areas or provide the basis for why a formal characterization plan is not necessary.

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5	TBD-WM-906 Section 6.	Attachment 1, Section 6.4, Table 6-5 does not provide all necessary information to interpret the data.	10CFR20.2002(a)	Average concentration values are assumed by the bold font values beneath each radionuclide but, it is unclear how these values were calculated.	Clarify how Table 6-5 values are produced and provide additional statistics such as median, standard deviation, and distribution (e.g., normal, lognormal, etc.)
6	TBD-WM-906 Section 6.5	In Attachment 1 Section 6.5 the final paragraph states that the data are sufficient to serve as the basis for determining the radionuclide concentration in materials shipped.	10CFR20.2002(a)	An argument for the conclusion that the data are of sufficient quality has not been presented (as elaborated upon in RAIs applicable to Section 6.4), and the provided documentation does not support that conclusion.	Refer to previous comments indicating that a formal characterization plan should be developed or provide the basis for why a formal characterization plan is not necessary.
7	TBD-WM-906 Section 7.1 and Appendix G	TBD Section 7.1 and App. G Figure 1 are not descriptive of piping location.	10CFR20.2002(a)	The link between piping to area and building populations is unclear.	Provide additional graphics or tables to clearly segregate piping and identify the location.
8	TBD-WM-906 Section 8.0	(a) Attachment 1, Section 8.0 and Table 8.1 do not provide justification for scaling factors other than by	10CFR20.2002(a)	Justification for the use of building scaling factors for miscellaneous equipment is not sufficiently detailed to allow for an independent assessment. Survey data to substantiate the usage of these scaling factors do not	Justify specifically why these scaling factors are appropriate. Provide details on survey data that substantiate the usage of building scaling factors for miscellaneous equipment.

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		reference,  (b) Table 8.3 lists different trace elements than earlier in the document.		<p>appear to have been provided.</p> <p>It is unclear what “equivalent” equipment means as it is noted that the “use of the scaling data is justified since the scaling factors were derived from equipment equivalent to that under consideration.”</p> <p>The trace elements reported earlier were Am-241, Np-237 and Pu239/240. Table 8.3 now lists Th-230 and -232 and Np-237.</p>	<p>Clarify what is meant by “equipment equivalent to that under consideration.”</p> <p>Provide information as to the difference in trace element radionuclides. Is there a separate listing of trace elements for HEPA systems relative to the remainder of the site? If so, please explain.</p>
9	TBD-WM-906 Section 8.1	Apparent lack of radioactive contamination results for HEPA units. Radiation survey results may miss internal contamination.	10CFR20.2002(a)	<p>For HEPA units, activity estimates are based on measurements of gamma radiation levels performed during the characterization of remaining equipment in 2008, and the gamma radiation levels were subsequently interpreted using the MCNP code to determine the amount and enrichment of U-235, and the amount of total uranium in each component. Tc-99 was then determined based on waste scaling factors derived</p>	<p>Confirm if any contamination measurements were taken on the equipment described in Section 8.1.</p> <p>A plan to characterize radioactive contamination on the HEPA units, which addresses NRC staff concerns that both external and internal contamination have been accounted for or the basis for why such a plan is not necessary, should be provided. If a plan is provided, the characterization method should ensure that shielding by the equipment itself does not result in an underestimate of contamination.</p>

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				<p>from the laboratory analytical data obtained during the initial characterization surveys and sampling performed in 2008 (Reference 3.1). It appears that no actual contamination samples were taken (only radiation exposure measurements).</p> <p>Sufficient justification was not provided on how radiation exposure measurements and MCNP are able to be used to fully characterize radioactive contamination on equipment. Contamination on internal surfaces could potentially be shielded by the equipment itself and may not be detected by exposure measurements. This could result in an underestimate of the contamination.</p>	
10	TBD-WM-906 Appendix D	Figure 1 provides the first indication of the characterization sampling plan.	10CFR20.2002(a)	Figure 1 and associated tables indicates the sampling that was done was primarily biased based on gamma walkover results or the presence of cracks/joints in the floor. There is no	Refer to previous comments indicating that a formal characterization plan should be developed or the basis for why such a plan is not necessary, should be provided. If a plan is provided, it is recommended that additional systematic probabilistic samples, based on the DQO process be developed and implemented

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				information for how the remaining locations were selected.	for the remainder of the slab and combined with documented alpha-beta surface scans.