



April 28, 2015

Mr. Eugenio Bonano  
U.S. Nuclear Regulatory Commission  
Office of Nuclear Materials Safety and Safeguards  
Division of Decommissioning, Uranium Recovery, & Waste Programs  
TWFN Mail Stop T-8F5  
Rockville, MD 20852

**SUBJECT: INDEPENDENT REVIEW AND DEVELOPMENT OF  
RECOMMENDED REQUESTS FOR ADDITIONAL INFORMATION  
FOR THE TECHNICAL BASIS DOCUMENTS AND FINAL STATUS  
SURVEY PROCEDURES PERTAINING TO CHAPTER 14 OF THE  
HEMATITE DECOMMISSIONING PLAN; HEMATITE  
DECOMMISSIONING PROJECT, FESTUS, MISSOURI  
(RFTA NO. 14-003, DOCKET NO. 070-00036); DCN 5184-DR-03-0**

Dear Mr. Bonano:

ORAU, under the Oak Ridge Institute for Science and Education (ORISE) contract, has reviewed the technical content of the following documents:

- *HDP-TBD-FSS-001 Rev. 0, Radiological Unrestricted Release Assessment of Soil Under the Natural Gas Distribution Pipeline*
- *HDP-TBD-FSS-002 Rev., Evaluation and Documentation of the Scanning Minimum Detectable Concentrations (MDC) for Final Status Surveys (FSS)*
- *HDP-TBD-FSS-003 Rev. 0, Modeling and Calculation of Investigative Action Levels for Final Status Soil Survey Units*
- *HDP-PO-FSS-700 Rev. 4, Final Status Survey Program*
- *HDP-PO-FSS-701 Rev. 5, Final Status Survey Plan Development*
- *HDP-PO-FSS-703 Rev. 1, Final Status Survey Quality Control*
- *HDP-PO-FSS-710 Rev.6, Final Status Surveys and Radiological Sampling of Re-Use Soil*
- *HDP-PO-FSS-711 Rev.5, Final Status Surveys and Sampling of Soil and Sediment*
- *HDP-PO-FSS-712 Rev. 3, Final Status Surveys of Structures, Systems, and Components (SSCs)*
- *HDP-PO-FSS-720 Rev. 1, Final Status Survey Data Integrity and Database Management*
- *HDP-PO-FSS-721 Rev. 5, Final Status Survey Data Evaluation*
- *HDP-PO-FSS-722 Rev. 3, Final Status Survey Reporting*

Enclosed are ORAU's comments and suggested requests for information (RAIs) for the U.S. Nuclear Regulatory Commission's (NRC's) consideration that resulted from the review of each document.

You may contact me at 865.241.8793 or Tim Vitkus at 865.576.5073 if you have any questions.



Sincerely,

A handwritten signature in black ink, appearing to read "E M Harpenau", with a long horizontal flourish extending to the right.

Evan M. Harpenau  
Health Physicist  
ORAU

EMH/fs

Enclosure

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**RECOMMENDED REQUESTS FOR ADDITIONAL INFORMATION FOR THE  
TECHNICAL BASIS DOCUMENTS AND FINAL STATUS SURVEY PROCEDURES  
PERTAINING TO CHAPTER 14 OF THE HEMATITE DECOMMISSIONING PLAN;  
HEMATITE DECOMMISSIONING PROJECT,  
FESTUS, MISSOURI**

Section	Page	Comment	Issue
<b>HDP-TBD-FSS-001 R0: <i>Radiological Unrestricted Release Assessment of Soil Under the Natural Gas Distribution Pipeline</i></b>			
NA	All	General. The document contains a number of editorial and grammatical errors, most of which do not impact the technical content. Only those errors which are of technical significance are specified in this matrix.	The document would benefit from a thorough editorial and grammatical review.
Section 8.0	13 of 39	The equation representing the Critical Value for the WRS Test is not correct. The second part of the equation under the square root should be divided by 12 instead of multiplied. $Vc = [m(n + m + 1)]/2 + Z\sqrt{[nm(n + m + 1)12]}$	According to the <i>Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)</i> , the equation should read: $Vc = [m(n + m + 1)]/2 + Z\sqrt{[nm(n + m + 1)/12]}$ This is a minor change but could have a significant impact to the critical value calculation.
Section 11.0	17 of 39	Paragraph beginning with “Migration of Tc-99”: Two different values are provided for the weighted average of Tc-99 in natural gas pipeline (NGP) soil. Initially, the weighted average is listed as 6.58 pCi/g. Then, halfway through the paragraph, that value changes to 5.69 pCi/g. The value reverts back to 6.58 pCi/g in the example that follows. The reviewer was unable to determine the origin of the 5.69 pCi/g value or if it was a typographical error.	Please provide an explanation of how the 5.69 was derived, and how it factors into the dose calculations, or replace it with the correct value.

Section	Page	Comment	Issue
<b>HDP-TBD-FSS-002 R1: <i>Evaluation and Documentation of the Scanning Minimum Detectable Concentration (MDC) for Final Status Surveys (FSS)</i></b>			
Section 1.1.1	4 of 38	The licensee has provided scan minimum detectable concentrations (MDC) calculations that are based on NUREG-1507 guidance. However, the text indicates that post-survey processed scan data are used for investigation decision making. It is important to note that the NUREG-1507 scan MDC paradigm, the associated equations, and the variables used for calculating scan MDCs are based on the signal detection theory. The parameters involved are a surveyor listening to the audio output, <i>a priori</i> estimates of the background and source distributions, and a specified level of performance in decision making based on the observed counts. The calculations presented are not appropriate for determining scan MDCs that are instead based on post-processed data.	<p>If the surveyor is not monitoring and responding to count rate changes in the field, then surveyor efficiency—which the site has set to 1, indicating the surveyor will not be involved with the decision process and does not deviate from the procedure requirement—and d' do not apply. Other factors that may or may apply to the post-processed data review include the 1 second observation interval which would only apply to the post-processed data if the detector output was recorded at 1 second intervals.</p> <p>MDC calculations should be revised based on the actual methods being used.</p>
Section 1.1.4	6 of 38	Second paragraph. The scan MDCs do not seem to be realistic for a 2-inch × 2-inch NaI scintillation detector. For example, extensive experience has shown that a Th-232 MDC of approximately 1.5 times the licensee's value of 0.75 pCi/g is very near the lowest value achievable with the type of detector indicated and that value was at the expense of a very high false positive rate of greater than 60%. It is the reviewer's opinion that the calculated value of 0.75 pCi/g is unrealistic. It should also be noted that other site documents—most notably those associated with the off-site borrow—have provided information that indicates highly variable site background	<p>ORAU requests that the licensee provide more realistic MDCs and explain how they intend to ensure the air gap mentioned is not exceeded. For example, will the site use some type of mechanical system? Furthermore, the site has set the surveyor efficiency to a value of 1 which essentially eliminates the human factors of surveying and would therefore require that an air gap of 2 inches or less must be maintained. It is unlikely that this can be achieved without mechanical assistance.</p>

Section	Page	Comment	Issue
		levels, a scenario that would further bring into question the ability to detect the claimed concentration with confidence. Additionally, refer to the comment immediately above regarding the use of post-processed data. What is the probability that the site could discern this value relative to typical detector background response variability?	
<b>HDP-TBD-FSS-003 R0: <i>Modeling and Calculation of Investigative Action Levels for Final Status Soil Survey Units</i></b>			
Section 2.0	4 of 48	It is stated that a 4,000 net counts per minute (cpm) investigative action level (IAL) would be conservative for detecting contaminants before they exceeded the derived concentration guideline level (DCGL). However, the MDCR calculation in HDP-TBS-FSS-002 suggests that a surveyor should be investigating count rate changes of 835 net cpm.	ORAU requests that the licensee explain the relationship between the IAL and MDC calculations. The scan MDC serves several functions; the first is to ensure that sample density is sufficient to detect potential hot spots of concern. However, what is the intent of estimating the very low, and in some cases unrealistic, scan MDCs if the survey instructions do not require any type investigation until count rates are at least four times the scan MDC?
Section 2.1	6 of 48	Table beginning with “MicroShield.” HDP-TBD-FSS-002 discusses a uranium enrichment of 4%; however, this document refers to a 3% enrichment but it does not discuss how/why the change from 4% occurred.	Is the text in this document representative of a different example and not a difference in default values? Also, ORAU requests that the language be consistent between technical basis documents (TBDs).
<b>HDP-PO-FSS-700 R4: <i>Final Status Survey Program</i></b>			
Section	14 of 65	Independent review of other documents (specifically DO-08-008) determined that a reasonable surrogate	ORAU requests that a justification be provided. A possible example of an explanation might be a

Section	Page	Comment	Issue
9.2.1.2		relationship has not yet been established for Tc-99.	discussion about regression analyses.
<b>HDP-PO-FSS-701 R5: <i>Final Status Survey Plan Development</i></b>			
Section 8.2.6.d	14 of 86	This issue with the scan MDC calculations was previously identified in the first comment for HDP-TBD-FSS-002 R1. Each related occurrence in this document should be revised accordingly.	See discussion of first issue for HDP-TBD-FSS-002 R1.
Section 8.3.5.b	20 of 86	The value 0.707 in the $MDC_{scan}$ equation corresponds to a (p) of 0.5, which is correct per NUREG-1507 and MARSSIM guidance. However, $p = 0.5$ in this section is inconsistent with the text in Section 8.2.6.	ORAU requests that the licensee reevaluate all MDC calculations and associated text, then revise accordingly and present calculated values for comparison against detection requirements.
Section 8.7.11.a	28 of 86	The equation as written is only indicative of a calculation for the sum of fractions (SOF) of one sample in a field of multiple contaminants. Final status survey (FSS) procedure HPD-PR-FSS-021 includes a different equation where $SOF_{Mean}$ ( $SOF_{avg}$ ) is written as: $SOF_{avg} = f_{SS} \sum_{i=1}^n \left( \frac{\bar{C}_{i,SS}}{D_{i,SS}} \right) + f_{RS} \sum_{i=1}^n \left( \frac{\bar{C}_{i,RS}}{D_{i,RS}} \right) + f_{DS} \sum_{i=1}^n \left( \frac{\bar{C}_{i,DS}}{D_{i,DS}} \right)$	ORAU requests that the equation be revised so that it is consistent with other procedures.
<b>HDP-PO-FSS-710 R6: <i>Final Status Surveys and Radiological Sampling of Re-Use Soil</i></b>			
Section 7.3	5 of 22	The reader is not sure what is meant by, "...and surveyed in a stockpile and the top 3 inches removed." The memo referenced may provide the necessary information, but the reviewer does not currently have access to that file.	For ease of independent review of this procedure it would helpful to review the basic tenets of HEM-13-MEMO-099.

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Section 7.5.1	6 of 22	Fifth bullet. The text does not discuss whether or not the composite sample method addresses all the compositing criteria, nor does it discuss what analyses will be performed.	ORAU requests an explanation as to how the composite sampling approach satisfies the applicable criteria and which analyses will be performed on the samples. In particular, the procedure should include instructions for developing a modified investigation level (MIL) of the composite analytical result.