

**From:** [Kauffman, Laurie](#)  
**To:** [Lamoreaux, Richard W CIV \(US\) \(richard.w.lamoreaux.civ@mail.mil\)](#)  
**Cc:** [Parks, Leah](#)  
**Subject:** Telephone Conversation Follow-up and 3rd Request for Additional Information  
**Date:** Tuesday, June 10, 2014 9:35:00 AM

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License No.: SUB-348  
Docket No.: 04006377  
Control No.: 581537

Dear Mr. Lamoreaux:

This is to document our discussion regarding your response to our request for additional information (RAI) e-mail dated March 20, 2014. During our telephone conversation on May 30, 2014, we stated that in order to continue our review, we need the following additional information:

- 1) In a previous RAI, dated March 20, 2014, we asked for your rationale regarding certain site-specific parameters used in RESRAD. All but one parameter, the "Radius of shape factor array", was provided. Please provide a rationale for the "Radius of shape factor array" parameter.
- 2) **Comment:** The screening values proposed for the buildings require further justification.

**Basis:** The licensee has proposed to apply the screening values for structures, tools and equipment surfaces as defined in Fuel Cycle Policy and Guidance Directive FC 83-23, entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Materials" (NRC, 1987).

The screening values in FC 83-23 are listed below.

- a. 5,000 dpm (83 Bq) per 100 cm<sup>2</sup> beta-gamma, averaged over 1 m<sup>2</sup>.
- b. 15,000 dpm (250 Bq) per 100 cm<sup>2</sup> beta-gamma, maximum<sup>[1]</sup>.
- c. 1,000 dpm (17 Bq) per 100 cm<sup>2</sup> beta-gamma, removable<sup>[2]</sup>.
- d. 100 dpm (2 Bq) per 100 cm<sup>2</sup> alpha, averaged over 1 m<sup>2</sup>.
- e. 300 dpm (5 Bq) per 100 cm<sup>2</sup> alpha, maximum.
- f. 20 dpm (0.3 Bq) per 100 cm<sup>2</sup> alpha, removable.

[1] The maximum contamination level applies to an area of no more than 100 cm<sup>2</sup>.

[2] The amount of removable radioactive material per 100 cm<sup>2</sup> of surface area should be determined by wiping that area with dry filter or soft "absorbent" paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits should apply independently. Since the radionuclides of concern (ROCs) for the site all emit alpha particles, the contamination would be limited to the 300 dpm (5 Bq) per 100 cm<sup>2</sup>, maximum.

Although the screening values in FC 83-23 were used for release of buildings and materials in the past, they were superseded with the implementation of the Licensed Termination Rule in subpart E of 10 CFR Part 20, issued July 21, 1997. As described in the "Supplemental Information on the Implementation of the Final Rule on Radiological Criteria for License Termination" published in the Federal Register on November 18, 1988 (63 FR 64132) and December 7, 1999 (64 FR 68395), these guidelines were superseded by DG-4006, "Demonstrating Compliance with the Radiological Criteria for License Termination", which is now superseded by NUREG-1757, "Consolidated Decommissioning Guidance." The FC 83-23 guidance is not dose-based and therefore its use requires additional justification that it meets the dose criteria in 10 CFR Part 20 Subpart E.

NUREG 1757, Vol. 2, Appendix H contains guidance on the use of acceptable screening criteria that is dose-based and will meet the 10 CFR 20 Subpart E limit of 0.25 mSv/y (25 mrem/y). Table H.1 includes acceptable levels for common beta-gamma emitters for building surface radioactivity. Note that Table H.1 does not include the ROCs because it does not include alpha-emitters. Acceptable screening values for additional radionuclides are provided in NUREG/CR-5512 Vol. 3, "Residual Radioactive Contamination from Decommissioning, Parameter Analysis, Draft Report for Comment", including acceptable screening values for Ra-226, U-234, U-235 and U-238. These values are replicated in Table 1.

**Table 1. NUREG/CR-5512 Vol. 3 Screening values in Table 5.19.**

	DCGL NUREG 5512 screening values in Table 5.19 $P_{crit} = 0.90$
Ra-226	1120
U-234	90.6
U-235	97.6
U-238	101

Use of the values in Table 5.19 of NUREG/CR-5512 Vol. 3 for  $P_{crit}$  of 0.90 would be an acceptable approach. Note that these screening values listed for the uranium isotopes are less than 300 dpm/100 cm<sup>2</sup>. Further guidance is provided in NUREG-1720, "Re-Evaluation of the Indoor Resuspension Factor for the Screening Analysis of the Building Occupancy Scenario for NRC's License Termination Rule" on use of a revised resuspension factor for the screening analysis of the building occupancy scenario for NRC's License Termination Rule. Use of the revised resuspension factor could derive DCGLs greater than the screening values.

The licensee must demonstrate that the residual radioactivity in building structures, systems and components, along with all other media at the site (e.g., soils) is in compliance with the applicable criteria (e.g., for unrestricted use, doses must not

exceed 0.25 mSv/y (25 mrem/y) and must be ALARA). The licensee must perform dose assessments using acceptable codes (or use NRC-approved screening dose assessments) to demonstrate compliance with the dose criteria.

**Path Forward:**

Please choose one of the following options:

**Option A:** If the licensee wishes to use the FC 83-23 values proposed, the license must demonstrate that these values are equal to or more conservative than a DCGL based on 25 mrem. To demonstrate that the FC 83-23 values are acceptable, the licensee may calculate site-specific DCGLs for building surfaces using either RESRAD BUILD or DandD code, (Version 2.1 or more recent). The use of draft NUREG-1720, and the revised re-suspension factor in this guidance, for site-specific calculation using the DandD code is an acceptable approach. Site-specific parameter values should be justified and input/output reports for the computer code should be included in the response.

**Option B:** If the licensee wishes to use site-specific values as opposed to the FC 83-23 values, the licensee may use the site-specific DCGLs for building surfaces derived as explained in Option A.

**Option C:** If the licensee does not wish to use the FC 83-23 values proposed or site-specific derived DCGLs, the licensee can choose to apply the screening DCGLs for the building surfaces for Ra-226, U-234, U-235, and U-238 found in Table 5.19 NUREG/CR-5512, Vol. 3 for  $P_{crit}$  value of 0.90.

- 3) **Comment:** The licensee should provide site-specific area factors and corresponding  $DCGL_{EMCs}$  for building surfaces and soil.

**Basis:** Section 7.12 of the licensee's submittal discusses area factors. It notes that "Interpolating into Table 5.6 of MARSSIM gives an area factor for 11.5 m<sup>2</sup> of 10.7 for 238U." However, Table 5.6 of MARSSIM includes the footnote that "the values listed in Table 5.6 are for illustrative purposes only," and to "consult regulatory guidance to determine area factors to be used for compliance demonstration." Because Table 5.6 values are for illustrative purposes only, the use of Table 5.6 for determining area factors is inappropriate. Instead, the licensee should follow guidance in NUREG 1757, Vol. 2, Revision 1, Appendix I, Section I.3.3.3.5 to derive site-specific area factors.

As stated in NUREG 1757, Vol. 2, Revision 1, Appendix I, "One method for determining values for the  $DCGL_{EMC}$  is to modify the  $DCGL_W$  using a correction factor (i.e., area factor) that accounts for the difference in area and the resulting change in dose. The area factor is the magnitude by which the concentration within the small area of elevated activity can exceed  $DCGL_W$  while maintaining

compliance with the release criterion.”

One way of obtaining area factors is to use the RESRAD code to calculate the dose for a given input activity and entire contaminated area size. Then the code is run for successively smaller contaminated area sizes and the resultant dose rates recorded. The area factor for the specific contaminant is the dose rate for the smaller area by the initial dose rate for the original area. The calculation can be performed for the desired number of contaminant areas. Note that the length parallel to the aquifer flow should also be changed when changing the area of the contaminated zone. The licensee may propose modifying the exposure pathways to account for the effect on the critical group's activities of a smaller area. For example, it may also be argued that the fraction of food originating from these smaller contaminant zones should also be changed, or that the exposure time should be modified. The licensee should justify all parameter changes from their default values.

**Path Forward:**

Provide site-specific area factors and corresponding  $DCGL_{EMC}$  values for building surfaces and soil following guidance in NUREG 1757, Vol. 2, Revision 1 Appendix I. Calculating area factors using RESRAD, RESRAD-BUILD, and/or DandD Version 2.1 codes is an acceptable approach. Site-specific parameter values should be justified and input/output reports for the computer code should be included in the response.

Lastly, please note that because our technical review is not yet complete, we may request additional information regarding your Decommissioning Plan.

**REMINDERS:**

Your submittal should not contain personally identifiable information (PII), such as date of birth, social security number, home addresses, and home telephone numbers. For additional information, refer to Regulatory Information Summary (RIS) 2007-04, "Personally Identifiable Information Submitted to the U.S. Nuclear Regulatory Commission", dated March 9, 2007, <http://www.nrc.gov/reading-rm/doc-collections/gen-comm/reg-issues/2007/ri200704.pdf>.

Your submittal also should not contain any Official-Use-Only Security-Related Information. The NRC issued guidance to its nuclear materials and export/import stakeholders to ensure information is not unnecessarily disseminated that terrorists could use to plan or execute an attack against facilities or citizens in the United States. This guidance is found in Regulatory Issue Summary (RIS) 2005-31, "Control of Security-Related Sensitive Unclassified Non-Safeguards Information Handled by Individuals, Firms, and Entities Subject to NRC Regulation of the Use of Source, Byproduct, and Special Nuclear Material." The RIS refers to the materials as "Security-Related Sensitive Information." <http://www.nrc.gov/reading-rm/sensitive-info/materials.html>.

Current NRC regulations and guidance are included on the NRC's website at [www.nrc.gov](http://www.nrc.gov); select **Nuclear Materials; Med, Ind, & Academic Uses**; then **Licensee Toolkits**, see our

**toolkit index page.** You may also obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-866-512-1800. The GPO is open from 8:00 a.m. to 5:30 p.m. EST, Monday through Friday (except Federal holidays).

We will continue our review upon receipt of this information. Please reply to my attention at the Region I Office and refer to Mail Control No. 581537. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5323.

Please note that you may not reply to this e-mail by return email. Your reply must be either in writing by letter or facsimile (610-337-5269). If we do not receive a reply from you within 30 calendar days from the date of this email, we will assume that you do not wish to pursue your application

Sincerely,

*Laurie A. Kauffman*

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