



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

June 8, 2006

Docket No. 04000341  
Control No. 138087

License No. STC-133

F. Kevin Reilly  
Director, Directorate of Environmental Management  
Defense Logistics Agency  
Defense National Stockpile Center  
Suite 3229  
8725 John J. Kingman Road  
Fort Belvoir, VA 22060-6223

SUBJECT: DEFENSE LOGISTICS AGENCY, REQUEST FOR ADDITIONAL  
INFORMATION CONCERNING APPLICATION FOR AMENDMENT TO  
LICENSE, CONTROL NO. 138087

Dear Mr. Reilly:

This is in reference to your letter dated December 8, 2005 requesting to amend Nuclear Regulatory Commission License No. STC-133 to approve site-specific derived concentration guideline levels (DCGLs) at the Hammond Depot, Hammond, Indiana. This request was reviewed with technical assistance from NRC staff in the Office of Nuclear Materials Safety and Safeguards. Staff reviewed the DCGL request document "Preliminary Site-Specific Derived Concentration Guideline Levels for the Hammond Depot, Hammond, Indiana," prepared for the Defense Logistics Agency, Defense National Stockpile Center (DLA/DNSC) by the Oak Ridge Institute for Science and Education (ORISE), and other supporting documentation provided with your request. In order to continue our review, we need the following additional information:

1. Comment: The assumption that residual radioactivity in soil at the Hammond Depot is limited to the top 15 centimeters requires additional justification.

Basis: In section 1.3 (page 3) of the DCGL request document, the text states that the contamination was assumed to be in the top 15 centimeters (cm) of soil based on an evaluation of the site history, including anticipated mobility of thorium in the environment and Oak Ridge Institute for Science and Education (ORISE) scoping survey results. In the "Radiological Scoping Survey of the Hammond Depot" report (Vitkus, 2005), it was acknowledged that gamma readings from sample holes showed a potential for subsurface contamination within the burn cage area. Additional justification is needed for the assumption regarding the depth of the contamination which significantly impacts the DCGL calculations. If multiple DCGLs will be calculated based on the soil contamination profile, DLA/DNSC should justify the vertical discretization of its DCGL calculations, e.g., surface to 15 cm and subsurface from 15 cm to depth. Knowledge regarding the depth to the industrial slag below ground surface would be integral to determining the soil intervals for which a DCGL should be calculated, since the

chemical and hydrologic properties of the industrial slag are expected to be quite distinct from the overlying surface soil.

Provide additional information to justify its assumption that contamination is limited to surface soils or provide additional information regarding its intended approach for addressing subsurface contamination.

2. Comment: Sufficient justification for the external gamma shielding factor used in RESRAD is lacking.

Basis: The external gamma shielding factor of 0.55 selected by the DLA/DNSC for use in the RESRAD model to calculate the soil DCGLs for U-238 and Th-232 should be independently verified (e.g., Microshield or Monte Carlo Neutral Particles [MCNP] calculations) to demonstrate that the value chosen is reasonable or conservative for natural thorium and uranium decay series constituents. While the default value of 0.55 in DandD based on NUREG/CR-5512, Volume 4, was used, given the importance of this parameter value and the site-specific nature (radionuclide and building material dependent) of this parameter value, the licensee should provide additional justification for the value selected in its deterministic analysis. While the default parameter distribution in RESRAD is skewed significantly lower (less conservative) with a mean around 0.30, the uncertainty in this radionuclide-specific parameter should be reduced to decrease the uncertainty in the DCGL calculation.

Perform additional research, modeling, and/or field experiments to justify the selection of the external gamma shielding factor used in RESRAD for the constituents and building materials present at the Hammond Depot site. Provide the results for review.

3. Comment: The indoor fraction used in the RESRAD is not consistent with the outdoor fraction selected based on NUREG/CR-5512, Volume 3.

Basis: DCGLs for soil were calculated based on an indoor fraction of 0.50 and outdoor fraction of 0.12 (outdoor fraction based on NUREG/CR-5512). The indoor time fraction should be changed to 0.66 for consistency with the outdoor fraction selected from NUREG/CR-5512, Volume 3.

Confirm that you will use an indoor fraction of 0.66.

4. Comment: Additional justification for the distribution coefficients used in the RESRAD analysis is needed.

Basis: Section 1.3, page 4, of the DCGL request document discusses the presence of subsurface soil consisting of high pH industrial slag overlying the fine sand and silt aquifer. Variability of the attenuation capacity of subsurface materials during vadose zone transport was not addressed in the licensee's analysis. Justification for the generic distribution coefficients (Kds) used in the analysis (Table 3, page 29) appears warranted, e.g., the affects of high pH industrial slag on the solubility and sorption of Th and U decay chain series radionuclides is necessary

to demonstrate the distribution coefficients selected are reasonable or conservative. The selection of distribution coefficients significantly impacts the dose from natural uranium and associated daughters, e.g., the peak dose from natural uranium is over 25 mrem and DCGL is less than 1 pCi/g, if the default distribution coefficients in RESRAD are used. Similarly, the potential impact of using generic plant transfer factors for industrial slag should also be investigated particularly if the depth of contamination is found to be greater than 15 cm and the plant ingestion pathway becomes more important.

Provide documentation that shows how you will reduce the uncertainty, or at a minimum consider and manage the uncertainty in the DCGL calculation, due to the variability of the distribution coefficients and plant transfer factors used in the analysis.

5. Comment: DLA/DNSC should examine the significance of parameter values related to the plant ingestion pathway.

Basis: Section 4.3.2.1, Page 32, "Ingestion Parameter", states that the significance of dietary and non-dietary parameters on the DCGL determination is minimal, since the external dose pathway dominates the dose. However, the plant ingestion pathway and the plant transfer factor for Ra-228 is actually one of the most important parameter values when the depth of contamination is increased. The plant ingestion pathway may have been less significant in your analysis, since the depth of contamination was assumed to be 0.15 m, thereby, minimizing the contribution of this pathway to the peak dose. However, as discussed in Item No. 1 above, the thickness of contamination requires further justification, as it significantly affects the results of the analysis and the importance of the plant ingestion pathway.

Determine the significance of parameters affecting the plant ingestion pathway through additional sensitivity and uncertainty analysis, consistent with your finding with respect to Item No. 1 above.

6. Comment: DLA/DNSC did not provide sufficient justification for use of the default inhalation rate for the RESRAD-BUILD DCGL calculations.

Basis: The default inhalation value recommended in NUREG/CR-5512, Volume 3, is 33.6 m<sup>3</sup>/hr while the default value of 18 m<sup>3</sup>/day in RESRAD BUILD was used in the licensee's analysis.

Justify your use of the default value for the inhalation rate in RESRAD BUILD, or modify your selection of the inhalation rate in RESRAD BUILD.

Current NRC regulations and guidance are included on the NRC's website at [www.nrc.gov](http://www.nrc.gov); select **Nuclear Materials; Medical, Industrial, and Academic Uses of Nuclear Material**; then **Toolkit Index Page**. Or you may obtain these documents by contacting the Government

F. Reilly  
Defense Logistics Agency

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Printing Office (GPO) toll-free at 1-888-293-6498. The GPO is open from 7:00 a.m. to 9:00 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. 138087. If you have any technical questions regarding this deficiency letter, please call me at (610) 337-5040.

If we do not receive a reply from you within 30 calendar days from the date of this letter, we will assume that you do not wish to pursue your application.

Sincerely,

***Original signed by Elizabeth Ullrich***

Betsy Ullrich  
Senior Health Physicist  
Commercial and R&D Branch  
Division of Nuclear Materials Safety

cc:  
Michael Pecullen

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**SISP Review Complete: EUllrich**

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