October 28, 2008

MEMORANDUM TO: John Kinneman, Director
Division of Nuclear Materials Safety
Region I

FROM: Patrice Bubar, Deputy Director **/ra/**
Environmental Protection
and Performance Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

SUBJECT: RESPONSE TO TECHNICAL ASSISTANCE REQUEST DATED AUGUST 11, 2008, FOR THE REVIEW OF DOSE MODELING SUPPORTING THE DECOMMISSIONING PLAN FOR THE BUILDING 1103A AREA AT ABERDEEN PROVING GROUND

Region I submitted a Technical Assistance Request, dated August 11, 2008, requesting a determination of appropriateness of a site-specific Derived Concentration Guideline Level (DCGL) for depleted uranium contaminated soils at the Building 1103A Area located at the Aberdeen Proving Ground (APG). This site-specific DCGL was originally approved by the NRC for use by the licensee at the Transonic Range at APG and has more recently been approved for use at the R-14 Range Area. The licensee provided a description of the development of the DCGL for the Building 1103A Area in "Determination of the Derived Concentration Guideline Level (DCGL) for Building 1103A Area Soils" [ML081550557]. The Performance Assessment Section has completed its review of the licensee-generated DCGLs and has provided a Technical Evaluation Report (enclosed). Based upon this review, the staff finds that the licensee-derived DCGL is appropriate and the use of this DCGL value meets the U.S. Nuclear Regulatory Commission dose criteria for license termination.

If you have any questions regarding this review, please contact Adam Schwartzman of my staff. He can be reached at 301-415-8172 or adam.schwartzman@nrc.gov.

Enclosure: Technical Evaluation Report

cc: Eugene Cobey

CONTACT: Adam Schwartzman, DWMEP/PAB
(301) 415-8172

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ML082960482

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Aberdeen Proving Ground Building 1103A Area Technical Evaluation Report
Prepared by: Adam Schwartzman, Systems Performance Analyst
October 22, 2008

Background

The Department of the Army is decommissioning the Building 1103A Area of the U.S. Army Research Laboratory (ARL) located at the Aberdeen Proving Ground (APG). This area was used as a radioactive material processing and storage facility. Characterization of the site revealed that activities in this area resulted in radiological contamination to several structures and soils, but not groundwater. The licensee intends to use NRC screening criteria for the release of structures, but would like to use a site-specific Derived Concentration Guideline Level (DCGL) of 230 pCi/g for the release of surface soils. This DCGL was originally developed for use in decommissioning the Transonic Range at APG, an area also contaminated with depleted uranium. It is also being used to decommission the R-14 Range Area at APG. The decommissioning plan for the Transonic Range was approved by the NRC in 2001 and the site has subsequently been remediated and released. Decommissioning-related activities are ongoing for the R-14 Range Area.

The licensee performed a dose assessment to demonstrate that the use of the site-specific DCGL generated for the Transonic Range is appropriate for the Building 1103A Area. In addition, NRC staff performed an independent analysis to verify that the use of the DCGL value from the Transonic Range for the Building 1103A Area is appropriate.

Source Term

The radionuclides of interest present at the Building 1103A Area are limited to depleted uranium isotopes (U-234, U-235, and U-238) and their progeny. These radionuclides are assumed to have activity fractions of 0.084, 0.012, and 0.904, respectively. These activity fractions were based on the isotopic uranium ratios used for shipments of DU waste from APG. No subsurface contamination was observed during the characterization of the area so the soil contamination is assumed to be limited to the surface (i.e., the top 6 inches).

The activity fractions assumed in the dose modeling performed for the Transonic Range, which was also contaminated with depleted uranium, differed from those assumed for the Building 1103A Area. Calculating the DCGL for the Transonic Range involved the analysis of three different activity fraction cases and selecting the most conservatively calculated DCGL. The first case was based on the mean activity obtained in all sample results in all 100 samples resulting in activity fractions of 0.211, 0.0205, and 0.768 for U-234, U-235, and U-238, respectively. The second case used only mean sample results for samples containing more than 1 pCi/g of U-235, resulting in activity fractions of 0.138, 0.0234, and 0.839 for U-234, U-235, and U-238, respectively. The third case was based on the sample results from all of the samples except those that were considered “hot spots”. The 87 samples resulted in activity fractions of 0.222, 0.0193, and 0.788 for U-234, U-235, and U-238, respectively. The DCGL resulting from the second case was the lowest and therefore selected as the site-specific DCGL for the Transonic Range.

The licensee’s analysis of the Building 1103A Area used the resident farmer scenario in RESRAD. The same scenario was used to develop the DCGLs for the Transonic Range

with the exception of the radon pathway which was not included in the analysis of the Building 1103A Area. The exclusion of the radon-222 pathway is consistent with the statements of consideration for the License Termination Rule.

Scenarios, Modeling, and Results

In 2001 a DCGL value was derived for the Transonic Range using RESRAD Version 5.82 based on an evaluation of both the resident farmer and industrial worker scenarios. The dose to these receptors was evaluated over a period of 1000 years. The residential farmer scenario was found to be more restrictive so the DCGL value generated using this scenario was used. The pathways considered in the resident farmer scenario were: direct exposure from contaminated soil, inhalation of contaminated dust, inhalation of radon-222, ingestion of plant foodstuffs grown in contaminated soil and irrigated with groundwater drawn from a well located within the decontaminated area, ingestion of meat from livestock fed fodder grown in the decontaminated area and irrigated with groundwater from the decontaminated area, ingestion of milk from milk animals raised with fodder and irrigation groundwater drawn from the decontaminated area, ingestion of fish from a pond drawing water from the decontaminated area, ingestion of onsite soil, and ingestion of water drawn from an onsite well. The resulting DCGL calculated for the Transonic Range was 230 pCi/g.

The licensee performed a dose analysis using RESRAD Version 6.3 to demonstrate that the use of the DCGL value for the Transonic Range is appropriate for the Building 1103A Area. In this analysis the resident farmer scenario was used. The same pathways were used as in the analysis for the Transonic Range with the exception of the inhalation of radon-222 pathway. Parameters used in the analysis were selected from NRC and EPA guidance documents. RESRAD default values were used in cases where information was not available in NRC and EPA guidance documents. NRC staff found that the scenario, pathways, and parameter values selected are acceptable.

The DCGL value calculated by the licensee for the Building 1103A Area in this dose analysis was 253 pCi/g. The DCGL value for the Transonic Range is lower than the one calculated for the Building 1103A Area; therefore the use of the Transonic Range DCGL for the Building 1103A Area would be conservative.

Independent Analyses

NRC staff performed an independent evaluation of the dose to a member of the public using RESRAD 6.3 to verify the licensee's results. Calculations done by the staff yielded a DCGL for U-238 of 247 pCi/g, which was different then the licensee's U-238 DCGL of 249 pCi/g listed in Table 4.1 of Appendix C, Determination of Derived Concentration Guideline Level (DCGL) for Building 1103A Area Soils. Ultimately differences in the combined DCGL calculated by the staff and the licensee were minimal.

NRC staff also performed a sensitivity analysis to determine the sensitivity of the dose to the ratio of radionuclides present in the depleted uranium. Staff found that there was not a significant difference between the dose calculated using the ratio of radionuclides assumed in the calculations for the Transonic Range and the dose calculated using the ratio assumed for the Building 1103A Area.

Conclusion

The NRC staff has reviewed the dose modeling analysis performed for the Building 1103A Area to evaluate if the use of the DCGL value of 230 pCi/g originally developed for the Transonic Range is appropriate. The staff concludes that the dose modeling completed for the Building 1103A Area is reasonable and is appropriate for the exposure scenario under consideration. Staff also concludes that the use of the DCGL value developed for the Transonic Range is appropriate for the Building 1103A Area due to the similarity in the source material, the location of the two sites, and the fact that the Transonic Range DCGL is more conservative than the one calculated for the Building 1103A Area. The dose modeling analysis performed for the Building 1103A Area and the Transonic Range provides reasonable assurance that the dose to the average member of the critical group is not likely to exceed the 0.25 mSv (25 mrem) annual dose criterion for unrestricted use in 10 CFR 20.1402. This conclusion is based on the modeling effort performed by the licensee and the independent analysis performed by the NRC staff.

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