December 22, 2006

MEMORANDUM TO: J. Kinneman, Acting Director
Division of Nuclear Materials Safety, RI

FROM: Scott C. Flanders, Deputy Director **/RA/**
Environmental Protection & 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 OCTOBER 18, 2006, FOR THE DEPARTMENT OF THE ARMY, RESEARCH, DEVELOPMENT & ENGINEERING COMMAND

Introduction

Region I submitted a Technical Assistance Request (TAR), dated October 18, 2006, to evaluate the dose estimate of the Westwood Radioactive Material Disposal Facility (WRMDF) at Aberdeen Proving Ground. The dose estimate concludes that the site has demonstrated compliance with the dose criterion in 10 CFR 20.1402 for unrestricted release.

The WRMDF site is located adjacent to the installation boundary of the Edgewood area of the Aberdeen Proving Ground, Maryland. The 2.0-acre site was formerly used to process and package radioactive waste prior to disposal. Thereafter, the facility was used for radioactive waste research and development. Reportedly, no actual radioactive waste disposal was performed onsite.

According to the Westwood Study Area report entitled “Assessment of Residual Cs-137 in Sediment, Westwood Radiological Material Disposal Facility, March 2006,” the first substantial decommissioning and decontamination effort occurred in the early 1970s. In addition to the demolition of the buildings, the concrete tank pit was also demolished, as well as concrete pads used as work surfaces. Debris from the buildings and other structures were disposed off site as radioactive waste. The underground wastewater for both the radioactive wastewater and sanitary systems were left in place.

From August 1997 through September 1998, remediation was accomplished under the U. S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Under joint oversight by the EPA and the U. S. Nuclear Regulatory Commission (NRC), the removal action resulted in the unrestricted release of the WRMDF site.

As a part of the radiological risk assessment under CERCLA, soil, sediment, surface water and groundwater throughout the site were sampled and analyzed. Sampling analysis found that a small volume of sediment in the marsh exhibited residual Cs-137 contamination. The Cs-137

residual contamination was primarily associated with underground wastewater lines and structures, including a small area in the marsh adjacent to a wastewater line headwall.

As stated in the Westwood Study Area report, CERCLA determined that "the residual Cs-137 does not pose an unacceptable risk to future military/industrial workers and that because the dose would be less than the regulatory criteria of 25 mrem/y, that there was no reason to reexamine release of the site from the NRC license." However, in a follow-up phone conversation between NRC and the licensee, NRC requested a detailed report from the licensee describing the extent of the radioactivity, the proposed actions, and basis for the proposed actions for the small area containing the residual Cs-137 contamination. The requested information is described in the Westwood Study Area report which concludes that further remediation is not warranted since the expected dose is below the 25 mrem/y dose criterion.

Source Term

Radioactivity in the small area of the site is estimated to be 0.00255 Ci of Cs-137. The estimated size of the area with elevated radioactivity in surface sediment is 100 ft^2 (9.29 m^2). The larger area of subsurface sediment with elevated Cs-137 levels is estimated to be 375 ft^2 (34.84 m^2). The estimated total volume of contaminated sediment is 72 yd^3 (55.05 m^3). The calculated average mass concentration of Cs-137 in the total volume is 36.6 pCi/g.

The calculated average concentration and volume of Cs-137 contamination in the four depth intervals investigated are listed in the following Table.

Depth (m)	**Volume (m^3)**	**Average Concentration (pCi/g)**
0 - 0.15	1.53	131
0.15 - 0.61	10.70	28
0.61 - 1.22	21.41	47
1.22 - 1.83	21.41	23

Scenario Selection and Exposure Pathways

A variety of scenarios were considered to evaluate the potential exposure of the residual Cs-137 contamination in sediment to a critical group. As an example, one of the scenarios considered involved construction on the contaminated area with a worker serving as a member of the critical group. Based on the report, the marsh sediment does not provide a suitable foundation for construction. The sediment would either be excavated and removed from the site or the site would be backfilled with the Cs-137 contamination left in place beneath the backfill. Further, the area of contamination is located in wetlands where existing environmental regulations prohibit construction in the wetland area. Because there is little to no potential for exposure to the Cs-137 contamination in this case, the licensee did not evaluate this scenario.

Another scenario considered by the licensee involved excavation of the contaminated Cs-137 sediment for use at a construction site as topsoil or fill material. It was determined that because the marsh sediment mixture of silt, sand, and organic matter is not suitable for use at a construction site as topsoil or fill material, a dose estimate for this scenario was not evaluated.

The recreational scenario was utilized to evaluate the potential exposure to the residual Cs-137 contaminated sediment. Recreational land use addresses exposure to individuals who spend limited amount of time on the site while fishing, hunting, hiking, or engaging in other outdoor activities. In the Westwood dose assessment, the following potential exposure pathways were included in the assessment:

- Direct external exposure from residual Cs-137 radioactivity in the sediment;
- Internal exposure from inhalation; and
- Ingestion of sediment with residual Cs-137 radioactivity.

As a point of reference, the Westwood dose assessment included an alternate scenario involving the relocation of the contaminated sediment in an upland area which is not located in the marsh area of the site. The potential exposure pathways were the same as those modeled in the recreational scenario.

The staff believes that the critical group, scenario, and exposure pathways used in the dose assessment were appropriate for the contaminated area.

Parameter Selection and Calculations

RESRAD version 6.3 was used in the licensee's dose assessment to estimate the potential dose from exposure to the residual Cs-137 contamination in sediment. The contaminated zone was assumed to be 100 ft^2 (9.29 m^2) with a contaminated zone thickness of 2.0 ft (0.61 m). The Cs-137 concentration in sediment was estimated to be 131 pCi/g. The fraction of time spent outdoors was assumed to be once a week, for 36 weeks, with a 2-minute exposure time for each exposure event. The estimated dose for this scenario resulted in 0.0275 mrem/y. Using RESRAD version 6.3, the staff performed an independent analysis assuming that the fraction of time spent outdoors was increased to 50 hours in one year. The estimated dose resulted in approximately 1 mrem/y.

In the alternate scenario, a worker was assumed to occupy an office space over the contaminated area for 6 hours each day, 225 days per year. All other input parameter values were the same values used for the recreational scenario. The estimated dose resulted in 20.7 mrem/y.

The staff performed analyses using the parameter values selected by the licensee to confirm the conclusions of the dose assessment. Staff reviewed the model input parameters and concluded that the parameters used were acceptable and appropriate for the conceptual site model.

Conclusions

The staff finds that the source term, scenario, and exposure pathways used in the assessment were appropriate. Further, staff believes that the input parameters were consistent with site

conditions. The staff concludes that the dose assessment for the residual Cs-137 sediment contamination is acceptable and demonstrates that the site meets the dose criterion in 10 CFR 20.1402 for unrestricted release without further remediation.

References

General Physics Corporation, Westwood Study Area, Assessment of Residual Cs-137 in Sediment, Westwood Radiological Material Disposal Facility, U. S. Army Garrison, Aberdeen Proving Ground, March 2006.

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References

General Physics Corporation, Westwood Study Area, Assessment of Residual Cs-137 in Sediment, Westwood Radiological Material Disposal Facility, U. S. Army Garrison, Aberdeen Proving Ground, March 2006.

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