

**SAFETY EVALUATION REPORT  
APPROVAL OF DEFENSE LOGISTICS AGENCY DECOMMISSIONING PLAN,  
CURTIS BAY DEPOT  
DOCKET NO. 04000341**

### 1.0 Executive Summary

The Defense Logistics Agency (the Licensee) is in the process of closing out its depots across the country, including Curtis Bay Depot (the Facility), with the intent to terminate its U.S. Nuclear Regulatory Commission license. License No. STC-133 was issued on February 14, 1957, pursuant to 10 CFR Part 40, and has been amended periodically since that time. This license authorized the Licensee to possess uranium and thorium as natural uranium and thorium mixtures as ores, concentrates and solids for the purpose of storage, sampling, repackaging and transfer for the activities of the National Defense Stockpile. The Licensee has ceased operations involving licensed materials at the Facility. They have submitted a decommissioning plan which included site-specific derived concentration guidelines (DCGL's) to allow unrestricted release of the Facility.

### 2.0 Facility Operating History

NRC staff has reviewed the information in the "Facility Operating History" section of the Decommissioning Plan for the Facility according to the Consolidated Decommissioning Guidance, Volume 1, Section 16.2 (Facility Operating History). Based on this review, NRC staff has determined that the Licensee has provided sufficient information to aid NRC staff in evaluating the Licensee's determination of the radiological status of the Facility and the Licensee's planned decommissioning activities, to ensure that the decommissioning can be conducted in accordance with NRC requirements.

### 3.0 Facility Description

The Facility is located at 710 East Ordnance Road, Baltimore, Maryland and is in an industrial area. The Facility is situated on approximately 483 acres of large, grassy open areas and some lightly wooded areas. There are various building pads, buildings and warehouses, some functional and others in a serious state of disrepair. A number of paved and dirt roads, along with railroad tracks, traverse the site. The Facility is bordered on three sides by creeks; on the southwest by Back Creek, on the south by Furnace Creek and on the east by Curtis Creek.

### 4.0 Radiological Status of Facility

NRC staff has reviewed the information in the "Facility Radiological Status" section of the Decommissioning Plan for the Facility according to the Consolidated Decommissioning Guidance, Volume 1, Section 16.4 (Radiological Status of Facility). Based on this review, NRC staff has determined that the Licensee has described the types and activity of radioactive material contamination at the Facility sufficiently to allow the NRC staff to evaluate the potential safety issues associated with remediating the Facility, whether the remediation activities and radiation control measures proposed by the Licensee are appropriate for the type of radioactive

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material present at the Facility, whether the Licensee's waste management practices are appropriate, and whether the Licensee's cost estimates are plausible given the amount of contaminated material that will need to be removed or remediated.

## 5.0 Dose Analysis

The staff has reviewed the dose modeling analyses for the site-specific DCGLs as part of the review of the Licensee's decommissioning plan, using the Consolidated Decommissioning Guidance, Volume 2, Section 5.2 (Unrestricted Release Using Site-Specific Information). The staff concludes that the dose modeling is reasonable and is appropriate for the exposure scenarios under consideration. In addition, the dose estimate 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 in 10 CFR 20.1402. This conclusion is based on the modeling effort performed by the Licensee and the independent analysis performed by the staff.

The Licensee calculated soil DCGLs of 3.3 picocuries/gram (pCi/g) for natural thorium (Th) and 2.2 pCi/g for natural (U); and building DCGLs of 400 disintegrations per minute/100 square centimeters (dpm/100 cm<sup>2</sup>) for natural thorium and 800 dpm/100 cm<sup>2</sup> for natural uranium. Based on a review of the "Preliminary Site-Specific Derived Concentration Guideline Levels" report NRC staff determined that additional information was needed to approve DCGLs for the site. Requests for additional information were generated to address important parameters and exposure pathways identified during NRC staff's independent review. The primary pathways of exposure for natural Th and U contaminated soil are the external gamma and plant ingestion pathways. Additionally, U could also migrate to groundwater and pose a risk through the drinking water pathway. The primary pathway of exposure for a building occupancy scenario is the inhalation pathway for both natural Th and U; therefore, parameters related to dilution of air contamination (e.g., building size and air exchange rate), source available for inhalation (e.g., source area, removable fraction, air fraction), source release rate (e.g., release time), and exposure parameters (e.g., indoor time fraction, breathing rate) are most important to peak dose for a building occupancy scenario.

The following specific issues were addressed by the Licensee.

- The Licensee submitted the results of its characterization survey that showed significant subsurface contamination at the radiological waste disposal area between 0.5 and 2 meter (m) in depth and extending in some cases past 4 m in depth over an area of 440 m<sup>2</sup>. The Licensee stated that it expects to remediate all areas of the site with known subsurface contamination. The Licensee did not think consideration of uncertainty in parameters related to the plant ingestion pathway was warranted for surficial contamination. Final survey results should confirm that contamination is not significantly thicker than 15 cm in the radiological waste disposal area post-remediation. It is not appropriate for the licensee to use the calculated surficial soil contamination DCGLs for areas of the site with contamination significantly thicker than 15 cm.
- The Licensee provided additional radionuclide-specific support for its selection of the external gamma shielding factor. NRC staff finds this justification adequate.
- The indoor time fraction was changed to 0.66 and a revised DCGL calculation provided for total Th in the Licensee's submittal of 2.9 pCi/g.

- In regards to the selection of distribution coefficients for input in the RESRAD code used for soil DCGL calculations the Licensee clarified the conceptual model for the site and showed a cross-section that contained only sandy loam and no clay on the west end of the site. Additional sensitivity runs performed by the Licensee also indicated that if the clay layer is absent and the vadose zone thickness is 20 ft (6 m) or less, that the DCGL would be significantly lower at a value of 1.1 pCi/g. In fact, the vadose zone thickness as reported in the Licensee's most recent January 12, 2007, submittal shows a depth to groundwater of 19.2 feet (ft) (6 m) in the vicinity of the radiological waste disposal area and 26 ft (8 m) in the vicinity of the medical supplies burial area. The depth to groundwater provided by the Licensee is from the top of well casing. Using well construction log information provided in a Parsons Engineering report (1999), the vadose zone thickness should be around 17 ft (5 m) near the radiological waste disposal area and 22 ft (7 m) in the vicinity of the medical supplies area. Using the actual vadose zone thickness measured at the radiological waste disposal area and the medical supplies area, the deterministic soil DCGL for natural U (U-238) for the west end of the site would be approximately 1.1 pCi/g using loam Kds and no clay layer. However, based on a review of additional information and its own independent probabilistic dose assessment, NRC staff concluded that assigning the Licensee's proposed loam Kds to all hydrostratigraphic layers in the model is overly conservative. Despite the description of the subsurface geology provided by the licensee in its August 8, 2006 response well construction logs for groundwater wells CB-GW-03 and CB-GW-04 located near the medical supplies burial area and radiological waste disposal area, respectively, show the presence of a clay and silt layer at approximately 8 to 16 ft (2 m to 5 m) below ground surface in the CB-GW-03 borehole and some clay present in various intervals between 4 to 25 ft (1 m to 8 m) below ground surface in the CB-GW-04 borehole. While other areas of the site do not appear to have the same clay interval (e.g., CB-GW-02 near stockpile area two), the most contaminated areas of the site appear to have some clay intervals present in the subsurface which will provide significant attenuation to mitigate the potential impact to groundwater. Therefore, the U soil DCGL of 2.2 pCi/g calculated assuming the presence of a clay layer in the vadose zone is reasonable.

- The Licensee provided results from the groundwater sampling in its January 2007 submittal. This sampling indicates no detectable levels of Th or U in groundwater near the radiological waste disposal and medical supplies burial areas of the site, nor in surface water at Back Creek on the western end of the site.

Additionally, the Licensee clarified that the depth of the contamination in the radiological waste disposal area did not extend to saturated groundwater (boreholes were advanced in 0.5 m intervals until several intervals showed no visible sign of materials present in the pit). Remedial activities should result in the removal any potential deep source of contamination in the radiological waste disposal area that presents a threat to groundwater.

- NRC also questioned the greater than expected depth of contamination underneath one of the contaminated buildings (B-911) from contamination which migrated from the building into the underlying foundation and subsurface which indicates a higher mobility than would be expected for Th assuming a distribution coefficient of 3300 L/kg. The Licensee attributed the high mobility of natural Th to the presence of a relatively thick sand layer placed as a foundation for the building that resulted in the settling of the floor slab and the creation of multiple cracks in the slab that allowed liquid spills to penetrate to a depth greater than would be expected into the subsurface. NRC staff finds this explanation reasonable.

- In regards to the inhalation rate for the RESRAD-BUILD DCGL calculations, the default

inhalation value recommended in NUREG/CR-5512, Volume 3, is 33.6 cubic meters/day ( $\text{m}^3/\text{day}$ ) while the default value of 18  $\text{m}^3/\text{day}$  in RESRAD BUILD was used in the Licensee's analysis. The Licensee corrected the breathing rate and also noted in its submittal that the default value for the indoor time fraction should have been more appropriately assigned a value of 0.27. The changes to these parameter values offset one another, and the licensee requested continued use of the building DCGLs it proposed in its original submittal.

While there is significant uncertainty in the parameters and parameter distributions used to calculate building DCGLs, NRC staff's independent assessment shows the Licensee's DCGLs are reasonable and that the Licensee attempted to minimize the amount of dilution of air contamination by selecting room sizes that were significantly smaller than the total warehouse area and volume. It is important to note that the floor area is negatively correlated to dose, while competing with the source size which is positively correlated to dose (source size can increase with increasing floor area). A comparison of results for various floor areas and corresponding source areas was made. The higher the floor area, the lower the dose. These results suggest that the increased dilution inherent in a larger room size is of greater magnitude than the increased dose from a larger source area. Therefore, while some of the licensee's selection of parameter values may not be conservative, NRC staff finds that on balance the Licensee's analysis is reasonable.

- The Licensee explained that all deconstructed building surfaces would remain on site and that these materials were not expected to be contaminated and that characterization survey results did not indicate the materials had been contaminated from licensed operations. Therefore, the Licensee argued that there was no need to develop additional site-specific DCGLs for these deconstructed building materials.

## 6.0 Planned Decommissioning Activities

The NRC staff has reviewed the decommissioning activities described in the Decommissioning Plan for the Facility according to the Consolidated Decommissioning Guidance, Volume 1, Section 17.1 (Planned Decommissioning Activities). Based on this review the NRC staff has determined that the Licensee has provided sufficient information to allow the NRC staff to evaluate the Licensee's planned decommissioning activities to ensure that the decommissioning can be conducted in accordance with NRC requirements.

## 7.0 Project Management and Organization

The NRC staff has reviewed the description of the decommissioning project management organization, position descriptions, management and safety position qualification requirements and the manner in which the Licensee will use contractors during the decommissioning of the Facility according to the Consolidated Decommissioning Guidance, Volume 1, Section 17.2 (Project Management and Organization). Based on this review, the NRC staff has determined that the Licensee, has provided sufficient information to allow the NRC staff to evaluate the Licensee's decommissioning project management organization and structure to determine if the decommissioning can be conducted safely and in accordance with NRC requirements.

## 8.0 Radiation Safety and Health Program

The NRC staff has reviewed the information in the Decommissioning Plan for the Facility according to the Consolidated Decommissioning Guidance, Volume 1, Section 17.3 (Radiation Safety and Health Program During Decommissioning) . Based on this review, the NRC staff has determined that the Licensee has provided sufficient information to allow the NRC staff to conclude that the Licensee's radiation safety and health program during decommissioning will comply with 10 CFR Parts 19 and 20.

#### 9.0 Environmental Monitoring and Control Program

The NRC staff has reviewed the information in the Decommissioning Plan for the Facility according to the Consolidated NMSS Decommissioning Guidance, Volume 1, Section 17.4 (Environmental Monitoring and Control Program) . Based on this review, the NRC staff has determined that the Licensee has provided sufficient information on the staff to conclude that the Licensee's program will comply with 10 CFR Part 20.

#### 10.0 Radioactive Waste Management Program

The NRC staff has reviewed the Licensee's descriptions of the radioactive waste management program for the Facility according to the Consolidated NMSS Decommissioning Guidance, Volume 1, Section 17.5 (Radioactive Waste Management Program) . Based on this review, the NRC staff has determined that the Licensee's programs for the management of radioactive waste generated during decommissioning operations ensure that the waste will be managed in accordance with NRC requirements and in a manner that is protective of the public health and safety.

#### 11.0 Quality Assurance Program

The NRC staff has reviewed the Quality Assurance Program for the Facility according to the Consolidated NMSS Decommissioning Guidance, Volume 1, Section 17.6 (Quality Assurance Program). Based on this review, the NRC staff has determined that the Licensee's QA program is sufficient to ensure that information submitted to support the decommissioning of the Facility should be of sufficient quality to allow the staff to determine if the Licensee's planned decommissioning activities can be conducted in accordance with NRC requirements.

#### 12.0 Facility Radiation Surveys

The NRC staff has reviewed the information in the Decommissioning Plan for the Facility according to the Consolidated NMSS Decommissioning Guidance, Volume 2, Section 4.2 (Characterization Surveys). This review has determined that the radiological characterization of the site, area, or building is adequate to permit planning for a remediation that will be effective and will not endanger the remediation workers, to demonstrate that it is unlikely that significant quantities of residual radioactivity has not gone undetected, and to provide information that will be used to design the final status survey.

The NRC staff also reviewed the information in the Decommissioning Plan for the Facility according to the Consolidated NMSS Decommissioning Guidance, Volume 2, Section 4.4 (Final Status Survey Design). Based on this review, the NRC staff has determined that Licensee's

final status survey design is adequate to demonstrate compliance with radiological criteria for license termination.

### 13.0 Financial Assurance

The NRC staff has reviewed the cost estimate for the Facility according to the Consolidated NMSS Decommissioning Guidance, Volume 3, Section 4.1 (Cost Estimate (as Contained in a Decommissioning Funding Plan or Decommissioning Plan)). Based on this review, the NRC staff has determined that the cost estimate previously submitted by the Licensee adequately reflects the costs to carry out all required decommissioning activities prior to the license amendment releasing Curtis Bay Depot for unrestricted use.

The NRC staff also reviewed the financial assurance mechanism for the Facility according to the Consolidated NMSS Decommissioning Guidance, Volume 3, Section 4.3 (Financial Assurance Mechanisms). Based on this review, the NRC staff has determined that the financial assurance mechanism submitted by the Licensee is adequate to ensure that sufficient funds will be available to carry out all required decommissioning activities prior to license amendment releasing Curtis Bay Depot for unrestricted use.