U.S. NUCLEAR REGULATORY COMMISSION
DOCKET NUMBER 030-28641
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SAFETY EVALUATION REPORT
Related to Amendment Request to Revise Authority to Dispose of
Four M-47 Tanks Containing Depleted Uranium Material Pursuant to 10 CFR 20.2002
Materials License No. 42-23539-01AF
Issued to U.S. Department of the Air Force

1.0 BACKGROUND

On June 23, 2004, the U.S. Department of the Air Force (licensee), submitted a request to dispose of four M-47 tanks containing depleted uranium (DU), from the 98th Range Wing at Nellis Air Force Base, Nevada, to US Ecology, Idaho, a Subtitle C RCRA hazardous waste disposal facility. The request for approval is submitted pursuant to Section 20.2002 of Title 10 of the Code of Federal Regulations (10 CFR 20.2002), "Method of Obtaining Approval of Proposed Disposal Procedures."

Four U.S. Army M-47 tanks were used for target practice in Range 63, Target Area 10 at Nellis Air Force Base, Nevada. Nellis Air Force Base is located approximately 8 miles northeast of Las Vegas, Nevada. The base itself covers more than 14,000 acres, while the total land area occupied by Nellis and its restricted ranges is about 5,000 square miles. The 98th Range Wing is responsible for the 2.9 million acre Nevada Test and Training Range, located just north of Las Vegas.

2.0 TECHNICAL EVALUATION

NRC staff evaluated the licensee's analyses of disposal to a Subtitle C RCRA hazardous waste disposal facility to demonstrate compliance with 10 CFR 20.2002(d) using the general guidance for dose modeling in the NUREG-1727, SRP 5.2, supplemented by the decommissioning-specific guidance of the license termination rule.

2.1 SOURCE TERM

The M-47 tanks were contaminated with DU from A-10 aircraft target practice. The Air Force's analysis conservatively assumed the inventory of DU in each of the four M-47 tanks was the maximum number of penetrators that could have potentially hit each tank. Therefore, the source term is based on 40 GAU-8 30mm DU rounds. Each round contains 300 grams of DU. As a result of the kinetic energy released when a tank is hit by a DU round, some of the DU from the round will bond with the metal surrounding the entry point and the interior of the chamber. The DU is a metal form with a minor contribution as an oxide. The mass of the DU per tank is approximately 12 kg, and when averaged over the mass of the tank (60 tons), the source material is less than one-twentieth of 1 percent (0.05 percent) of the mixture. The staff considers these assumptions to lead to a conservative source term and considers this a valid approach for conducting a bounding analysis.

2.2 EXPOSURE SCENARIOS

The licensee requested that the disposal take place at US Ecology, Idaho, a Subtitle C RCRA hazardous waste disposal facility. The licensee analyzed three distinct exposure scenarios: (1) dose to a transport driver, (2) dose to the disposal facility worker, and (3) long-term impacts to a residence. While the licensee did not analyze the groundwater impacts from the disposal, the NRC staff reviewed previous analyses in support of NUREG-1640, which indicated that the groundwater pathway is not a controlling factor for DU. The NRC staff considers the four scenarios appropriate for the request.

The transport driver scenario considers the dose to the truck driver who is responsible for hauling the tanks to the disposal facility. US Ecology, Idaho, is approximately 800 miles from Nellis Air Force Base. The driving time would be approximately 16 hours, assuming average speed of 50 miles per hour. The licensee used empirical dose rate information based on a DU projectile. The calculation conservatively neglected any benefits as a result of shielding from the cab or tank armor. The licensee assumed the same driver transported all four tanks on four separate 16-hour trips. The transport driver calculation also assumed that 20 rounds (half of the total number of penetrators) were within 3 meters of the transport driver. The total dose calculated for this conservative estimate was 0.0024 mSv (0.24 mrem). NRC staff agrees that the only applicable exposure pathway for this scenario is direct radiation from the four tanks and the assumptions used are adequate.

The disposal facility worker scenario considers the potential dose to the worker responsible for loading, unloading, and burying the tanks. The calculation was based on an exposure time of 2 hours per tank. The only relevant exposure pathway is external because the tanks will be sealed prior to shipment. Since the tanks are sealed there would be no removable contamination on the exterior of the tanks. While no removable contamination is assumed, the scenario remains conservative based on the assumption that 20 rounds are in close proximity to the exposed worker. This scenario resulted in a conservative dose estimate of 0.0006 mSv (0.060 mrem). NRC staff continues to agree that the only applicable exposure pathway for this scenario is direct radiation from the four tanks and the assumptions used are adequate.

The third scenario analyzed by the licensee was the long-term impacts from the tanks. The licensee conservatively assumed that the mass of DU in the tank would mix instantly with a volume of soil equivalent to the displacement volume of the tank. The analysis assumed there was no cover present and assumed that a house was built over the disposal area. The pathways of exposure were external, inhalation, and radon. External exposure is the dominant pathway based on the DU. The result of this very conservative scenario was a peak annual dose of 0.009 mSv (0.9 mrem). NRC staff agrees that this scenario; however unlikely, is conservative and reasonably appropriate for long-term exposure assessment.

Each of the analyses conservatively estimated the exposure as less than 1 mrem total dose per year. The proposed action will not significantly increase the probability or consequences of accidents and there is no significant increase in occupational or public radiation exposures.

3.0 SUMMARY AND CONCLUSIONS

Based on the above analyses, the licensee has demonstrated, and the NRC staff has confirmed that the proposed 10 CFR 20.2002 disposal is expected to result in minimal risk to workers and the public. For the analysis, the licensee conservatively assumed that each of the four tanks contained forty DU rounds. The licensee analyzed the dose to the transport driver, disposal facility worker, and long-term impacts to a residence. While the licensee did not analyze the groundwater impacts from the disposal, NRC staff reviewed previous analyses in support of NUREG-1640, which indicate that the groundwater pathway is not a controlling factor for DU. The scenarios relied upon conservative bounding analyses. Each of the scenarios evaluated resulted in dose estimates of less than 0.01 mSv (1 mrem) total dose. Therefore, the NRC staff recommends approval of this modification to the licensee's authority to dispose of waste in accordance with 10 CFR 20.2002. Further, in accordance with the provisions of 10 CFR 40.14, "the Commission may, upon application by an interested person or upon its own initiative, grant such exemptions from the requirements of the regulations. . .as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest." Based on the above analyses, this material authorized for disposal poses no danger to public health and safety, does not involve information or activities that could potentially impact the common defense and security of the United States, and it is in the public interest to dispose of wastes in a controlled environment, such as that provided by a Subtitle C RCRA hazardous waste disposal facility. Therefore, to the extent that this material authorized for disposal in this 20.2002 authorization is otherwise licensable, the staff concludes that the material is exempt from further Atomic Energy Act (AEA) and NRC licensing requirements.

EA for USAF DU Tanks

cc: (via ADAMS distrib):
LDWert
CLCain
JEWhitten
DBSpitzberg
RSBrowder
RJEvans
FCDB File
Material Docket Files

SISP Review Completed: RSB ADAMS: ■ Yes ☐ No Initials: RSB
■ Publicly Available ☐ Non-Publicly Available ☐ Sensitive ■ Non-Sensitive

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