

Depleted Uranium

Performance Assessment and Safety Evaluation Report

Depleted uranium (DU) is a product of the uranium enrichment process. While it is initially less radioactive than naturally occurring uranium, it becomes significantly more radioactive over time, posing challenges for safe and effective long-term disposal.

Characteristics of Depleted Uranium

Uranium is composed of two primary isotopes: U-235 and U-238. Nuclear reactors need to use a higher concentration of U-235 than occurs naturally, so “enrichment” facilities concentrate fissionable U-235 from the uranium ore to increase the proportion of atoms that can be split to release energy. The material left after the enrichment process is “depleted,” meaning it has proportionately less U-235 and proportionately more U-238 than would occur naturally.

Unlike other low-level radioactive waste (LLRW), DU retains its radioactivity for a very long time. The decay products of DU become more radioactive over time due to ingrowth that occurs when “parent” uranium isotopes decay to produce “daughter” isotopes. If these daughter isotopes are unstable, they decay as well, producing even more daughters. As these daughter products grow, the total radioactivity from the uranium and its daughters increases. Radioactivity of DU peaks after about two million years.

Because DU reaches its peak activity at approximately two million years, qualitative modeling scenarios for its disposal have to take into account projected geologic changes over deep time, including global glacial cycles, the formation of pluvial lakes, and the deposition of sediments.

State Rules

Utah law allows the disposal of Class A waste but prohibits the acceptance of Class B and Class C waste. DU is currently classified as a Class A waste by the Nuclear Regulatory Commission (NRC).

In April 2010, the Radiation Control Board approved a new rule requiring a performance assessment (PA) before facilities in Utah could dispose of significant quantities of concentrated DU. The Board’s action was made to address the unique radiological characteristics of DU that were not considered by the NRC when it developed its limits on Class A low-level radioactive waste (LLRW) in the 1980s. The new state rule requires the licensee or applicant to develop a site-specific performance assessment (PA) and receive Director approval prior to accepting large quantities of concentrated DU for disposal.

Performance Assessment

A performance assessment (PA) is a technical evaluation that demonstrates that the disposal of radioactive materials will protect public health and safety and the environment. Under state rule, the PA must include a quantitative analysis that demonstrates that the waste disposal will meet stipulated performance objectives for a minimum of 10,000 years, with additional qualitative analyses for the period during which the DU reaches peak radiation activity, or approximately two million years. The PA must also analyze the following conditions to clearly demonstrate reasonable assurance that the exposures to humans and the environment from a potential release of radioactivity will not exceed protective limits:

- Protection of the public considering air, soil, ground water, surface water, plant, and animal pathways of radioactive exposure
- Protection of inadvertent human intruders

- Protection of individuals during operations
- Long-term stability of the disposal site based upon erosion, slope failure, settlement of wastes and backfill, infiltration through covers over disposal areas and adjacent soils, surface drainage of the disposal site, and the effects of changing lake levels.

Safety Evaluation Report (SER)

The Safety Evaluation Report (SER) summarizes the analyses that DEQ and its contractor SC&A performed to determine whether the PA meets federal and state regulatory performance criteria for DU disposal sites. The SER determines the extent to which the PA submitted by EnergySolutions complies with these regulatory requirements.

Conclusions in the SER are subject to reconsideration based on public comments and the record as a whole. DEQ has not made a formal recommendation or determination at this time regarding EnergySolutions' proposal. The director of the Division of Radiation Control will make the final decision on whether to issue a license amendment allowing EnergySolutions to dispose of large volumes of concentrated depleted uranium on the basis of the SER/PA and comments received during the public comment period.

Should the PA be approved, amendments to EnergySolutions' license and ground water permit would be required before DU could be disposed of at the facility. Those amendments would be addressed in separate licensing and permitting actions.

Public Comment

The public comment period will begin on April 13, 2015 and end on May 29, 2015. All comments must be received by 5:00 PM on May 29, 2015. Two public meetings have been scheduled to give the public an opportunity to make oral comments. Both public meetings will be preceded by an informational meeting from 5:00 PM. to 5:45 PM.

Wednesday, May 6, 2015
6:00 PM. to 8:00 PM.
Tooele County Courthouse
47 South Main Street, Tooele, Utah

Thursday, May 7, 2015
6:00 PM. to 8:00 PM.
Utah Department of Environmental Quality, Board Room #1015
195 North 1950 West, Salt Lake City, Utah

Email comments can be sent to swpublic@utah.gov with "Public Comment on SER/DUPA" in the subject line. Written comments should be submitted to:

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