

Very-Low-Level Waste Regulatory Framework



The American Nuclear Society (ANS) advocates a risk-informed policy for disposal of solid low-level waste (LLW) containing very low activity levels commensurate with the minimal risk it poses based on the following principles:

- Slightly radioactive solid materials—that yield an insignificant dose^a of ionizing radiation—do not need to be managed with the same level of rigor as that currently applied to LLW.
- Excessive regulation of these wastes results in increased handling and transportation and consumes resources unnecessarily.¹
- Alternative disposal options are available within the current regulatory framework for low-activity wastes that can be used with negligible risk to the public health and safety; however, a formal regulatory definition for a new class of waste could provide options for more efficient disposal of large quantities of LLW consistent with its safety hazard.

In conclusion, ANS believes that marginally radioactive solid wastes should be formally classified as very-low-level waste (VLLW) for the benefit of *both* the Nuclear Regulatory Commission (NRC) and waste generators. ANS urges the NRC to continue to monitor the external environment for trends and signposts that warrant changes to the existing VLLW regulatory framework, including the consideration of incorporating a Very-Low-Level Waste category into the evolving 10 CFR Part 61 rulemaking and associated regulatory guidance.²

a. The term “insignificant dose” would be appropriately defined through an NRC rulemaking process.

Background

Most naturally occurring or humanmade solid materials and artifacts contain some amount of radioactive material, contributing to an average background radiation dose of about 360 mrem/year (3.6 mSv/year) in the United States. In the current system for radioactive waste classification and management, the category with the least amount of ionizing radiation is Class A. There are no lower limits for the radionuclides used for classification: solids containing any amount of certain radionuclides can be a Class A waste. The NRC addresses the release of solid material on a case-by-case basis using license conditions and existing regulatory guidance.^{3,4}

The VLLW waste class is in use internationally to manage marginally radioactive solids. A VLLW category has been defined and is successfully used in France, Russia, the United Kingdom, Canada, Sweden, and Spain. There is no analogous VLLW category in the current waste classification system in the United States. In times past, the NRC informally used the same basic criteria to define VLLW on a case-by-case basis. While ANS agrees that this ad hoc approach is adequate for the disposal of marginally contaminated solid materials, ANS supports the consideration of incorporating a VLLW category to the evolving 10 CFR Part 61 rulemaking and associated regulatory guidance.² The formal creation of a VLLW category would streamline the waste classification and disposal process for *both* the NRC and waste generators.

The NRC has pursued policy statements and rulemakings in the past that considered adding a VLLW category, but the last rulemaking activity was formally discontinued in 2016.^{5,6,7} The reason cited for discontinuing the rulemaking was that “the current regulatory framework provides for case-by-case approval of alternate disposal

procedures under 10 CFR 20.2002.” Furthermore, in 2021 the NRC staff conducted a scoping study of various LLW issues as part of its LLW programmatic assessment.⁸ The outcome of that scoping study was an NRC staff recommendation to continue to operate under the existing framework because licensees have adequate flexibility with the current disposal options from a safety perspective, and updated 10 CFR 20.2002 alternative disposal guidance further supports this flexibility.

It is expected that the volume of solid wastes created by the decommissioning and environmental restoration of nuclear facilities will increase in the decades to come due to more facilities reaching end of life. Decommissioning typically creates large volumes of marginally contaminated concrete, soils, and sediments. The current case-by-case approach does not lend itself to substantial cost savings to manage such materials. A formal VLLW category could reduce the disposal costs of retiring nuclear facilities.

Defining the criteria for “insignificant dose of ionizing radiation” is not a trivial task. However, the Electric Power Research Institute (EPRI) has published a report⁹ that develops a technical basis for such a definition. By conducting numerous modeling studies with several different waste management scenarios, EPRI determined activity limits for a long list of radionuclides. The ultimate goal

was to protect a “maximally exposed individual” during waste management from an occupational dose that is no greater than 5 mrem/year (50 μ Sv/year). This conservative dose is a small fraction of what the public is exposed to from naturally occurring sources of radiation each year. EPRI applied the result of their studies to the current volume of Class A radioactive wastes and concluded that about 10 percent would be reclassified as VLLW. The percentage will likely increase substantially as the number of nuclear facilities decommissioned increases.

Formal rulemaking for VLLW would also clarify disposal options. Current LLW disposal facilities (the US Ecology Richland, Washington, Facility; the Barnwell Disposal Facility; the EnergySolutions Clive Disposal Facility; and the Texas Compact Waste Facility) are available for VLLW. However, alternative disposal sites may be more cost-effective. The EPRI report presents a case that Resource Conservation and Recovery Act (RCRA) facilities are appropriate as alternatives for VLLW disposal—lined, groundwater-monitored, and capped facilities that conform to RCRA Subtitle C. The engineering design of many RCRA facilities is comparable to LLW disposal facilities.

References

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708-352-6611
askanything@ans.org
ans.org