Performance Assessment of Waste Disposal

Summary

A performance assessment is an internationally accepted risk informed approach to evaluating whether a waste disposal facility protects human health and the environment. Performance Assessments are one factor that DOE must consider when assessing any waste stream for potential disposal under the HLW interpretation.

Through advanced risk management methodologies, performance assessments quantitatively evaluate disposal facilities' ability to prevent the release of radioactivity and the resulting potential radiological exposure.

DOE, NRC, U.S. Environmental Protection Agency, International Atomic Energy Agency, and regulators around the world rely on performance assessments to evaluate whether a waste disposal facility is safe and effective.

The following factors are considered when conducting performance assessments:

- How the disposal facility and the surrounding area function to prevent radionuclides from posing a threat to the selected receptor groups.
- Performance of facility equipment to ensure that waste is disposed of safely and with minimal radionuclide release and limited influx of water. This equipment includes storage casks and other engineered barrier systems.
- Movement of radionuclides through the engineered barrier system and geosphere (underground portions of disposal facilities with little to no human contact).
- Potential for radiological exposure to humans.

DOE guidelines for performance assessments are documented in DOE Standard, *Disposal Authorization Statement and Tank Closure Documentation* (DOE-STD-5002-2017).

NRC guidance for LLW Performance Assessments is documented in *A Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities* (NUREG-1573).

Performance assessments measure and evaluate risk by analyzing:

- The likelihood of a specific event occurring.
- The effect such an occurrence could have on a waste disposal system's performance.

For added protection of disposal facilities, DOE and NRC also require:

- The use of conservative models and data (safety margin);
- Additional barriers (defense-in-depth);
- Sensitivity/uncertainty analyses; and
- Comprehensive waste acceptance criteria.