



U.S. DEPARTMENT of ENERGY

Low-Level Waste Operations and Design Considerations

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Savannah River Site Citizens Advisory Board Meeting
January 27th, 2026



Savannah River Site Citizens Advisory Board

Purpose

- **Citizens Advisory Board requested a presentation concerning Low-Level Operations and Design Considerations.**
- **To give a high-level brief on the design and operations of the E-Area Low-Level Waste Facility (ELLWF)**
 - Authority to operate
 - Design consideration examples
 - Overview of ELLWF Operations

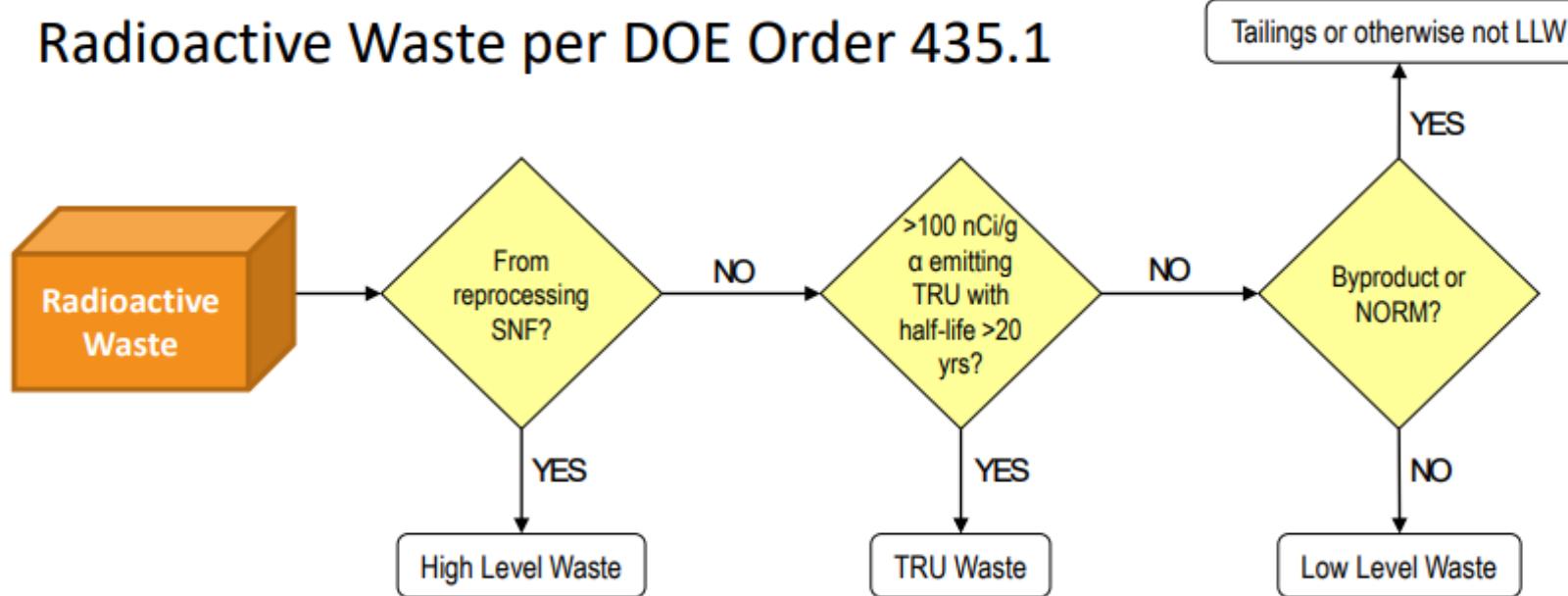


DOE Low-Level Waste Authority

- **Atomic Energy Act of 1954** - The AEA authorizes DOE to regulate possession, use and safe disposal of radioactive materials.
- **DOE O 435.1** - Radioactive Waste Management issued in 1999, provides the general objectives and applicability.
 - DOE M 435.1-1 - Radioactive Waste Management Manual provides requirements for waste planning, generation, characterization and disposal facility design, operations, and closure.
 - DOE Guide (G) 435.1-1 gives guidance for implementing the requirements.
 - DOE Standard DOE-STD-5002-2017 – content and format for Disposal Authorization Statement and Tank Closure Documentation
- **DOE considers applicable State and Federal Regulations**
- **Low-Level Waste Disposal Facility Federal Review Group (LFRG)** is the review group that approves and assesses LLW disposal facility performance.
- **The E-Area Low-Level Waste Performance Assessment (PA)** incorporates all requirements of DOE O 435.1 and once approved by the LFRG, a Disposal Authorization Statement (DAS) is issued. There is an annual review of the PA implementation.

Low-Level Waste

- LLW Radioactive waste is not High-Level Waste, spent nuclear fuel, TRU waste, byproduct material, or naturally occurring radioactive material



SNF – Spent Nuclear Fuel

HLW – High-Level Waste

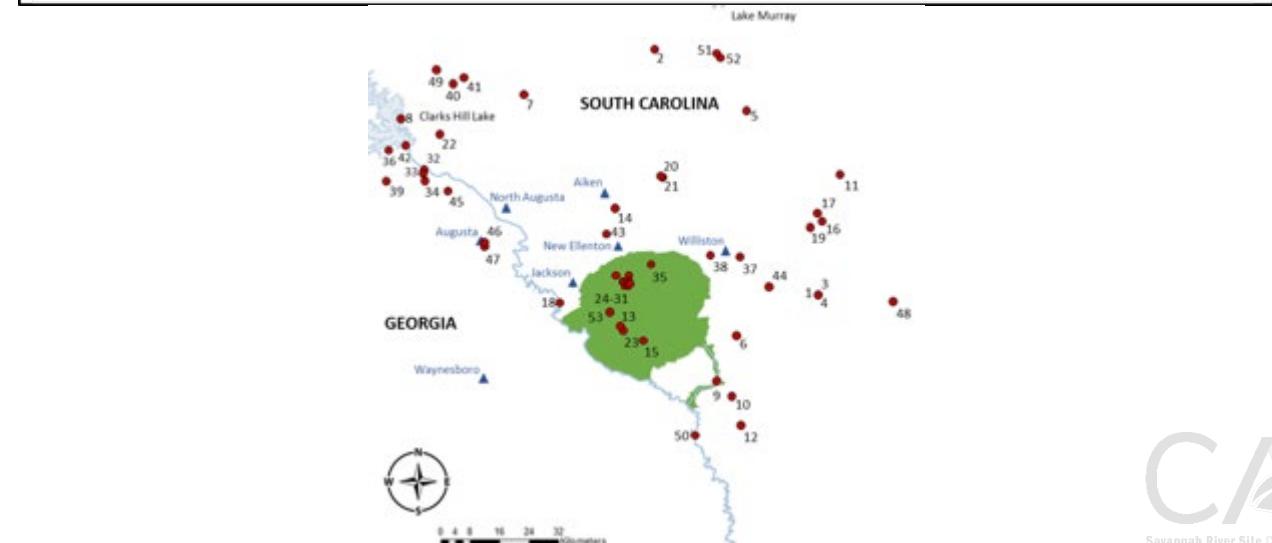
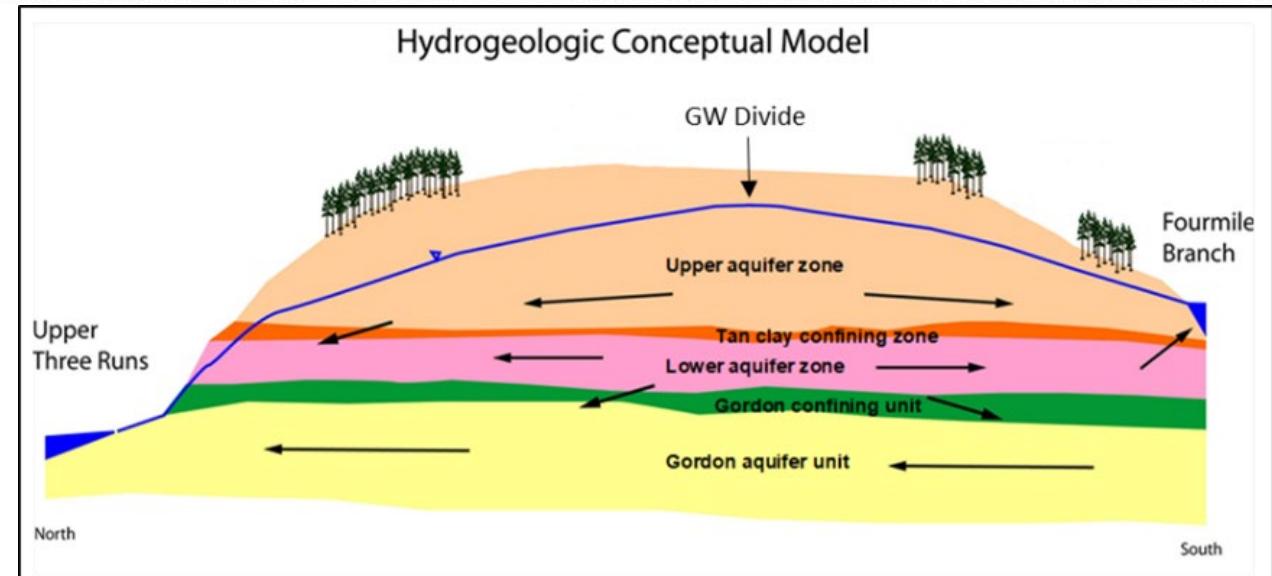
TRU – Transuranic

NORM – Naturally Occurring Radioactive Material

LLW – Low-Level Waste

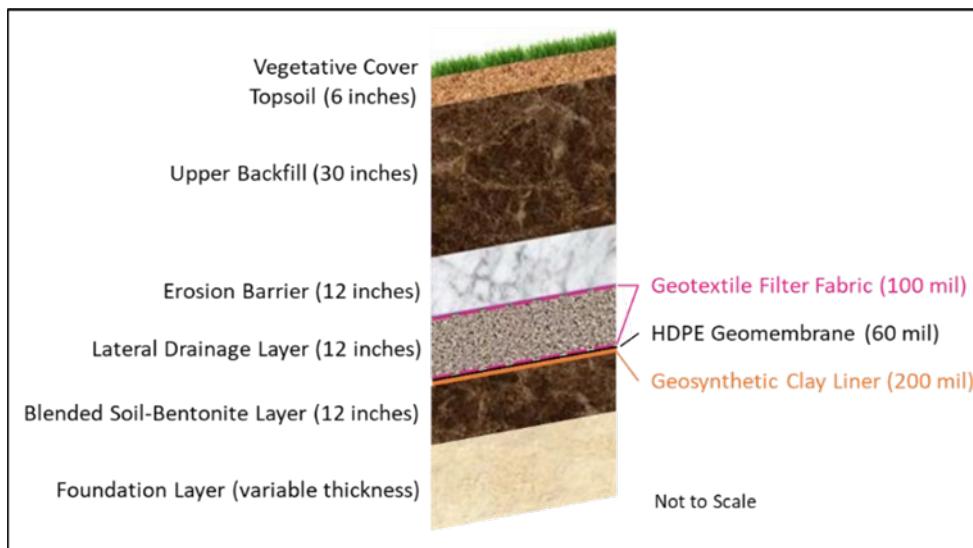
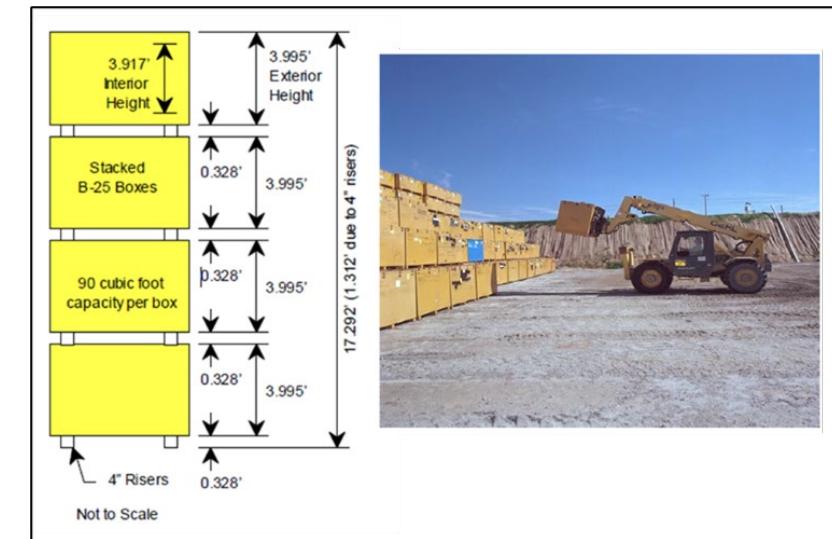
LLW Design Considerations – Input Examples

- Surface Water
- Groundwater
- Natural Drainage Features
- Average and Historical Rainfall
- Historic Hurricane Impacts on SRS
- Fault Lines Around / on SRS
- Historic Earthquake Locations and Magnitude
- Changes in Elevation
- Soil Types and Locations



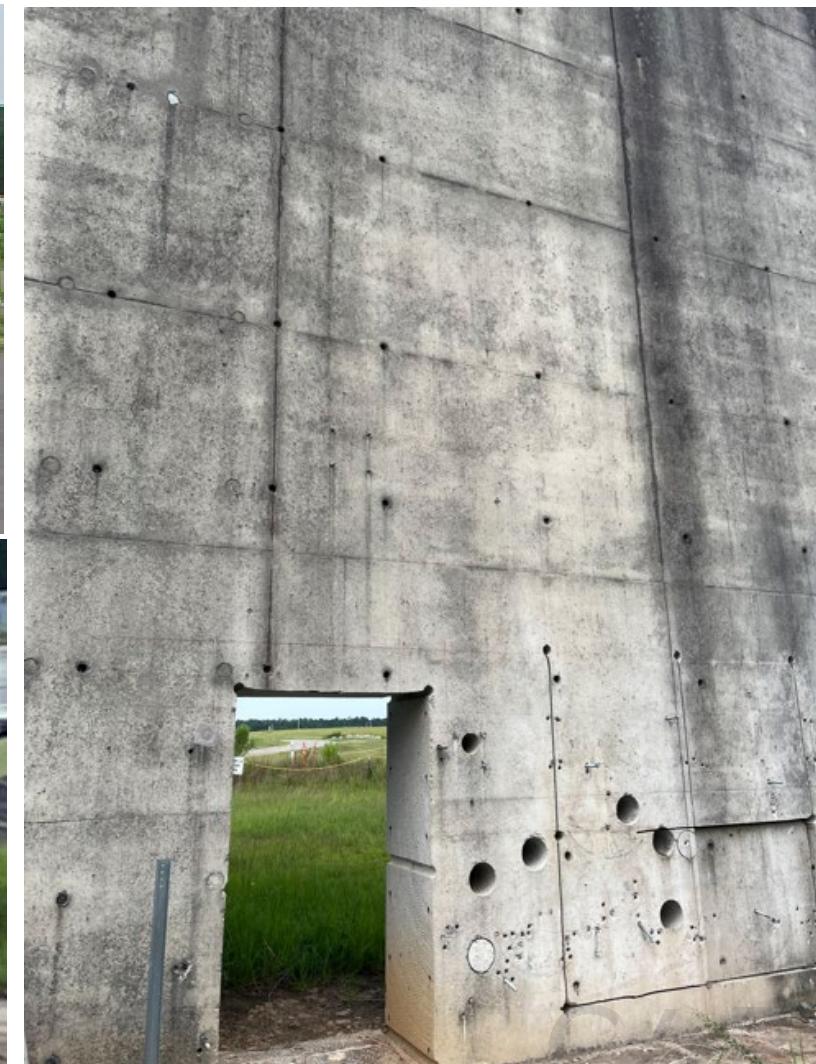
LLW Design Considerations – Direct Control Examples

- Disposal Unit Type and Location
- Number of Disposal Units / Open /Close
- How Waste is placed in the Disposal Unit
- Design of the Waste Containers
- Interim Cover Design & Install Date
- Design of Final Closure Cap
- Long-term Vegetative Cover Design
- Waste that is sent offsite

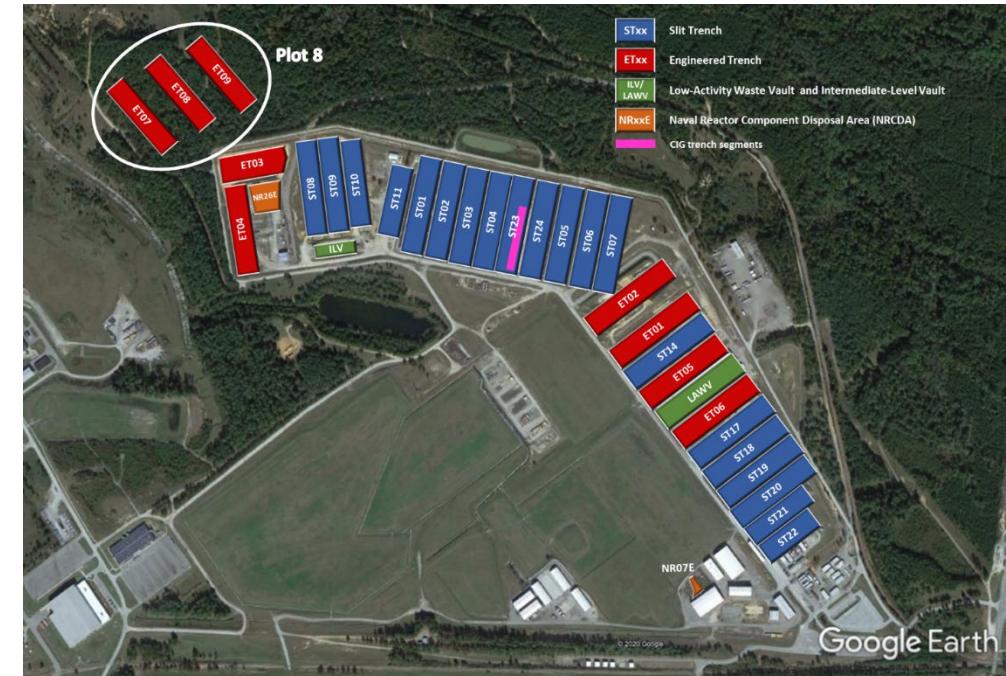


LLW Design Considerations – Verification and Experiments Examples

- Concrete Wall
- Coupon Field
- Lysimeters



E-Area Low-Level Waste Facility (ELLWF) Operations



ELLWF Waste Acceptance Criteria

- The Waste Acceptance Criteria (WAC) is provided to site generators via the Site Manual and serves as a blueprint on what can and cannot be brought into the ELLWF, packaging of containers, proper labeling of containers, and required documentation for the waste.
- What waste is accepted under the WAC
 - Low-Level Waste (LLW) including job control waste, soil, debris, rubble, etc.
- What is NOT allowed under the WAC
 - LLW with liquids, includes explosives, is gaseous or pressurized, not compatible with other waste, etc.
 - Mixed Low-Level Waste
 - TRU Waste
 - Hazardous Waste
 - LLW containing refrigerant

1S SRS Radioactive Waste Requirements Table of Contents				
Return to: Site-Level TOC	Return to: Site-Wide Procedures	Approved: Standard Scope Statements	Search: Searchbox	List of Cancelled 1S Procedures
All Bluesheets and/or Applicability statement(s) previously located on this Table of Contents have been vetted by the applicable Performing Entities and resolved accordingly. See the Scope section of the procedure for specific scope and applicability information. Contact the established Procedure Owner/SME (see SPPC Approval Authority matrices) for further assistance.				
Procedure No.	Title		Revision	Effective Date
Chapter-1	Waste Management Requirements		4	02/13/25
Chapter-2	Waste Certification Program		4	08/19/25
Chapter-3	Waste Characterization Program		8	10/01/24
Chapter-4	General Waste Requirements		8	08/19/25
Chapter-5	Low-Level Waste		3	04/13/23
Chapter-6	RCRA, TSCA, Mixed and LLLW		4	03/26/20
Chapter-7	Transuranic Waste		9	09/14/23
Chapter-8	Green-Is-Clean and Associated Waste		3	04/13/23
Chapter-10	Generation, Review, Approval and Control of Radioactive Waste Management Basis		1	10/01/24
Chapter-11	Unreviewed Composite Analysis Question		2	10/01/24
Appendices				
Glossary	Glossary		13	10/01/24
References	References and Bibliography		6	04/13/23

ELLWF Disposal Unit Types



Engineered Trench



Slit Trench



Low-Activity Waste Vault (LAWV)



Intermediate Level Vault (ILV)

ELLWF Engineered Trench

Engineered Trench

- Acceptable for routine LLW containers (B-25s, Sealands, etc.)
- Most cost-effective disposal option - first choice if feasible
- ET2 is approximately 82% filled
- ET3 closed in May 2022
- ET4 opened in February 2022, approx. 21% filled



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ELLWF Slit Trench

Slit Trench

- A cost-effective alternative to the Engineered Trench
- Weight limited based on crane capacity with setback restrictions
- Provides benefit of waste isolation



ELLWF Low-Activity Waste Vault

Low-Activity Waste Vault (LAWV)

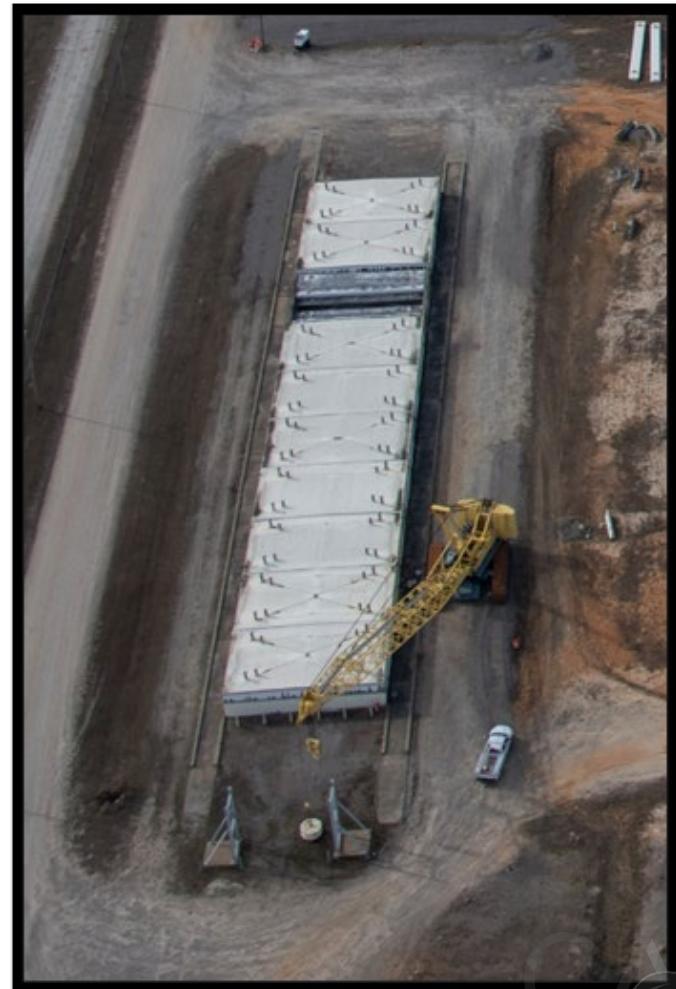
- For containers that exceed trench activity (Ci) limits
- For Leachable PCB waste (sump monitoring required)
- Much more expensive disposal option than earthen trenches
- Segregate LAWV waste from trench waste to minimize LAWV volumes



ELLWF Intermediate Level Vault

Intermediate Level Vault (ILV)

- For containers that exceed trench & LAWV activity (Ci) limits, or high dose rates
- Weight limited based on crane capacity with setback restrictions
- Acceptable for classified waste
- Most expensive disposal option



High-Level Summary of Generator Certification Program

SRS Waste Certification Program

- 1S Manual – governing documents that include DOE 435.1 and other regulatory requirements as well as the ELLWF waste acceptance criteria.
- SRS WAC Equivalency Crosswalk & LOIs – core program document describing how generators comply with 1S Manual WAC requirements.
- Periodic Reviews/Waste Certification Compliance Visit – this is a physical facility walkdown and documents review where all aspects of the program are scrutinized (characterization, generation, segregation, packaging, storage, training, procedures, QA and transportation).
- Initial/Continuing Training – expected of all generator personnel qualified to handle/manage/disposition/ship waste covered by the 1S Manual and the Waste Certification Program.



Summary

- DOE has the authority to approve and regulate the E-Area Low-Level Waste Facility.
- Low-Level Waste Disposal Facility Federal Review Group (LFRG) provides ongoing independent assessments and oversight.
- ELLWF safely and compliantly manages the disposal of low-level waste utilizing the different types of disposal units.

