Remediation to Post-Closure Site Management of the Edgemont, South Dakota Disposal Site

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Edgemont Remediation Snapshot

- The Edgemont, South Dakota, Disposal Site is a Uranium Mill Tailings Radiation Control Act (UMTRCA) Title II site.
- Tennessee Valley Authority (TVA) decommissioned and remediated the processing site.
- 4 million tons (3 million cubic yards) of radioactive waste materials was transported for disposal.
- Over 500,000 hauling miles were traveled to transport contaminated materials.
Edgemont Disposal Site Snapshot

- Mill tailings, contaminated soil, building equipment, materials and debris were moved 2 miles to the disposal site.
- The site occupies 360 acres, and the disposal cell occupies about 100 acres.
- Title to the disposal site land was transferred to the DOE in 1996.
- Disposal site inspections and cell vegetation monitoring are conducted and reported annually.

The disposal cell is designed to “be effective for 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years” (10 CFR 40, Appendix A)
Edgemont Processing Site Snapshot

- The site occupies 254-acres.
- Cottonwood Creek bisects the site.
- The site is bordered by the Cheyenne River to the north and the Pine Hills to the east.

Edgemont Processing Site Location Map

- Contamination covered the mill site.
- The processing complex consisted of a three-story steel structure and 7 ancillary buildings.
Edgemont Disposal and Processing Site Timeline

- **1956**: Mill constructed and operated by Mines Development, Inc.
- **1972**: Milling Operations Ceased
- **1974**: TVA acquired the mill; however, TVA never operated the mill for processing uranium ore due to economic, environmental and engineering factors.
- **1983-1984**: The original Edgemont Disposal Site closure design was completed and then revised.
- **1986**: NRC required TVA to begin decommissioning activities of the mill site.
- **1989**: Decommissioning activities were completed by TVA.
- **1996**: Site title was transferred from TVA to DOE.
Edgemont Processing Site Remediation

Main objectives of the remediation:
1) Stabilize soil
2) Make the site available for productive use
3) Restore the riparian community of Cottonwood Creek and the Cheyenne River

Remediation generally consisted of:
- Demolishing structures
- Excavating contaminated soils
- Relocating tailings and other contaminated materials
Edgemont Vicinity Remedial Action

Vicinity Properties

- Edgemont thoroughfares were traversed by a mobile gamma-ray scanning van operated by Oak Ridge National Laboratory.
- Properties identified by mobile scan were walked for handheld measurements by Pacific Northwest National Laboratory.
- Out of approximately 800 properties assessed, 137 were identified for cleanup.
- Vicinity property cleanup was completed in 1988.

Pine Hills

- 29 of the 41 acres of the Pine Hills area were cleared and revegetated.
- 12 acres that contained slight amounts of contamination were left undisturbed.
Edgemont Processing Site Today

1977 Edgemont Processing Site Aerial Photo
Mines Development

2014 Edgemont Former Processing Site Aerial Photo
Edgemont Processing Site Main Complex Today

1977 Edgemont Processing Complex Aerial Photo
Mines Development

2014 Edgemont Former Processing Complex Aerial Photo
Edgemont Disposal Haul Road Construction

- Constructed from the processing site to the disposal site in 1983
- Designed to accommodate:
  - Off-highway haul vehicles with 35-ton payload capacities
  - 25-year storm event drainage
- Decontamination of vehicles and dust suppression of loads to ensure contamination control
- Design and contaminant control measures were concurred upon by Fall River County Commission
- The 30-acre area of disturbance was reclaimed and revegetated after hauling ceased.
Edgemont Disposal Site Design Approach

- Engineered to remain protective for a minimum of 200 years
- Partially below-grade disposal
- Encapsulation of the waste

- Key features of the design:
  - Multicomponent cover system
  - Grass-covered disposal cell
  - Riprap armored containment dam, gully and diversion ditches
Disposal Cell Design Elements

- Underlain by 300-700 feet thick unweathered shale
- Basin walls were constructed with compacted clay averaging 13-foot-thickness
- The disposal site was constructed at the base of an ephemeral drainage, requiring construction of a containment dam.
- The upstream core of the containment dam was constructed with a compacted liner, 70-feet-thick at the center of the basin.
- Capped with 1-ft topsoil material, 5-ft of clean, compacted fill and 3-ft radon barrier of compacted clay for 9-ft total thickness
Edgemont Disposal Completion Summary

- Excavation, transportation, and encapsulation of ~3 million CY (4 million tons) of contaminated materials including sand tailings, slime tailings, structures, native soils and organic materials
- The construction of the containment embankment was staged over four years.
- Tailings were placed in layers each year to allow for tailings consolidation and to monitor settlement.

Over 500,000 hauling miles traveled to transport contaminated materials
Long-Term Surveillance and Maintenance Program

As the long-term custodian of the Edgemont Disposal Site, DOE has legal and regulatory requirements under the Code of Federal Regulations and the NRC.

A Long-Term Surveillance Plan (LTSP) describes how DOE will fulfill general license requirements.

LTSP requirements for the Edgemont Disposal Site are:

- Annual site inspection and report
- Follow-up inspections and reports, as necessary
- Site maintenance, as necessary
- Emergency measures and notifications in the event of a catastrophe
- Environmental monitoring
Long-Term Surveillance and Maintenance in Action

- Indian Canyon Fire burned across the Edgemont Disposal Site on July 19, 2016.
- Follow-up Inspection on July 22, 2016
- Erosion Assessment of the Disposal Site was performed in November 2016.
- Fire break was reseeded with native pollinator species in September 2017

The 2016 fire did not appear to cause harm to any of the engineered features of the disposal site and the disposal cell remained protective.
2016 Edgemont Erosion Assessment

Report recommended:
• Reseed with native vegetation
• Focus the inspection on areas more vulnerable to erosion
• Evaluate shifting from routine monitoring to event-based monitoring

The site was determined to have a negligible to low erosion potential.
Edgemont Disposal Site Today

• Boundary monuments, site marker, fencing and perimeter signs are permanent site features.
• Current beneficial reuse at the site includes cattle grazing and conservation.

• Unmanned drone aerial survey of the site was conducted in 2021 as a best management practice.
Edgemont Disposal Site Conservation Reuse

- A rangeland health assessment monitored the impacts of grazing.
- The interior fence is being evaluated to determine its impact on wildlife.
- The effectiveness of pollinator species seeding was monitored.

Fieldwork at Edgemont Disposal

Pollinator Plant at Edgemont Disposal
Future of the Edgemont Disposal Site

- System Operation and Analysis at Remote Sites (SOARS) system
  - Measure and provide atmospheric data
  - Alerts notify users about specific data thresholds and statistics
- National Weather Service Cooperative Observer Program site candidate
  - Provide near real-time information that supports forecasts, warnings and alerts
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