


---

---

---

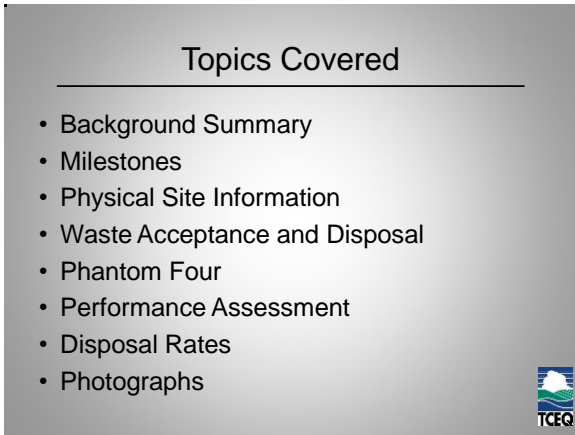
---

---

---

---

---




---

---

---

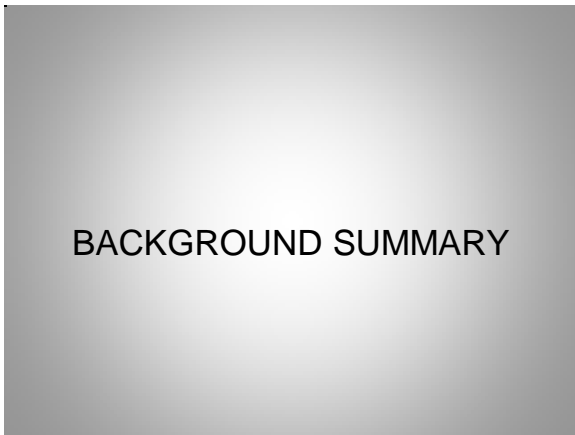
---

---

---

---

---




---

---

---

---

---

---

---

---

### The Texas Story

- In 1981 the Texas legislature established the Texas Low-Level Radioactive Waste Disposal Authority (TLLRWDA)
- After several siting studies a site in Hudspeth County, Texas was selected
- In 1992 the TLLRWDA submitted an application for a proposed low-level radioactive waste disposal facility to the Texas Water Commission (one of two predecessor agencies of the Texas Commission on Environmental Quality)
- In 1998 the license was denied due to failure to properly characterize faults in the area and socioeconomic concerns
- In 2001 Senate Bill 1541 allowed for the privatization of low-level radioactive waste disposal in Texas




---

---

---

---

---

---

---

---

---

---

### MILESTONES

---

---

---

---

---

---

---

---

---

---

### Major Milestones for the Texas LLRW Disposal Facility

- August 4, 2004: Waste Control Specialists LLC (WCS) submits an application for a radioactive materials license to build & operate a LLRW disposal facility in Andrews, Texas
- September 9, 2009: TCEQ issues Radioactive Materials License (RML) No. R04100 to WCS to dispose of LLRW
- January 7, 2011: TCEQ approves commencement of major construction
- August 25, 2011: TCEQ establishes interim disposal rates for the Compact Waste Disposal Facility (CWF)
- April 25, 2012: Operations and receipt of waste commence
- April 27, 2012 : First waste shipment received for disposal in the CWF
- May 9, 2012: First shipment of imported waste received




---

---

---

---

---

---

---

---

---

---

# PHYSICAL SITE INFORMATION

---

---

---

---

---

---

---

---

## Single License – Two Facilities

### • Compact Waste Disposal Facility (CWF)

- 29.66 acres
- Texas will take title to waste
- Authorized commercial LLRW disposal
  - o Disposal in steel reinforced concrete canisters with the void spaces filled with grout
  - o Disposal of bulk waste in a separate location within the CWF
  - o License limits– 2.3 million feet<sup>3</sup> in volume & 3.9 million curies in radioactivity
  - o Cell depth of approximately 90 feet

### • Federal Facility Waste Disposal Facility (FWF)

- 89.90 acres
- Facility & ownership governed by contract
- Authorized federal facility LLRW and mixed waste
  - o Disposal in steel reinforced concrete canisters with the void spaces filled with grout
  - o Disposal of bulk waste in a separate location within the FWF
  - o License limits - 26 million feet<sup>3</sup> & total radioactivity of 5.6 million curies
  - o Cell depth of approximately 100 feet




---

---

---

---

---

---

---

---

## WCS Facilities




---

---

---

---

---

---

---

---

# WASTE ACCEPTANCE AND DISPOSAL

---

---

---

---

---


---

---

---

## Important Waste Acceptance Considerations

- Generators of out of compact waste must obtain an import petition from the Texas Low-Level Radioactive Waste Disposal Compact Commission (TLLRWDC) prior to disposing of waste in Texas
- Waste acceptance must first occur at the CWF prior to waste acceptance at the FWF and the Secretary of Energy agreement to accept all right, title and interest in the federal waste disposal facility must be in place – Cooperative MOA as first step
- Waste acceptance criteria developed as a result of a statutory requirement and a site-specific performance assessment
- Two TCEQ resident inspectors will inspect every waste shipment and manifest received for proper classification and characterization prior to waste acceptance




---

---

---

---

---

---


---

---

## Waste Acceptance Criteria

- Waste Acceptance Criteria developed in response to several factors
  - Statutory requirement
  - Provide guidance to generators
  - Criteria based on site-specific intruder analysis and Branch Technical Position on Concentration Averaging
- Process for Development of Waste Acceptance Criteria:
  - Cooperative & open process with input from stakeholders
  - Waste Acceptance Criteria addressing waste acceptance into the CWF
  - Approved Waste Acceptance Criteria is an attachment to RML No. R04100 - current license posted online:

[http://www.tceq.state.tx.us/permitting/radmat/licensing/wcs\\_license\\_app.html](http://www.tceq.state.tx.us/permitting/radmat/licensing/wcs_license_app.html)




---

---

---

---

---

---

---

---

### Waste Acceptance Criteria (con't)

- Site- specific criteria for waste acceptance
  - Prohibited wastes such as free liquids
  - Radioactivity limits on certain radionuclides (i.e. <sup>14</sup>C)
  - Sealed source disposal consistent with NRC's Branch Technical Position on Concentration Averaging
    - Additional packaging limitations on sealed source disposal for <sup>14</sup>C and <sup>226</sup>Ra
  - Waste characterization requirements consistent with 10 CFR Part 20
  - Treatment, stabilization, and minimization allowed
  - Packaging and waste shipments must meet all DOT requirements




---

---

---

---

---

---

---

---

### Disposal

- State of Texas takes ownership of waste once all waste acceptance criteria have been satisfied and the waste is disposed
- Containerized Class A and Class B & C waste placed in reinforced Modular Concrete Canisters (MCCs)
  - Rectangular – approximately 10 ft x 10 ft x 9 ft, 6 in.-thick steel reinforced concrete
  - Cylindrical – approximately 10 ft x 8 ft, 6 in.-thick steel reinforced concrete
- Bulk waste disposal will occur using in-cell non-containerized disposal units in both the CWF and FWF




---

---

---

---

---

---

---

---

### Disposal (con't)



Cylindrical MCCs




---

---

---

---

---

---

---

---

### Disposal (con't)



Cylindrical MCC in Perspective




---

---

---

---

---

---

---

---

### Disposal (con't)

- First waste shipment received for disposal in the CWF in April 2012
- As of the date of this presentation a total of 73 waste shipments have been received and disposed of in the CWF
  - Predominantly Class B & C utility waste
  - Predominantly out-of-compact waste




---

---

---

---

---

---

---

---

### Phantom Four (P4)

---

---

---

---

---

---

---

---

### $^{14}\text{C}$ , $^{99}\text{Tc}$ , $^{129}\text{I}$ , $^3\text{H}$ , and ( $^{36}\text{Cl}$ )

- More mobile and long-lived with the exception of  $^3\text{H}$
- Dose drivers in performance assessment
- Separate manifest (NRC Form 541) totals required for these four radionuclides
- Difficult for utility generators to verify presence or absence of these radionuclides
- NUREG/BR-0204 advises reporting the lower limits of detection (LLD) for manifesting purposes if considered potentially present in unknown quantities




---

---

---

---

---

---

---

---

### Problems and Possible Solutions

- Performance assessment driving radionuclides often require curie limits to be placed in the license
  - Currently the Texas license has curie limits placed on  $^{14}\text{C}$ ,  $^{99}\text{Tc}$ , and  $^{129}\text{I}$ ; however, these current limits are being re-evaluated
- Using the LLD as a proxy value for the unknown activity may lead to over-reporting of the actual activity, which can be costly to generators for disposal fees and for disposal facilities by counting against their disposal limits
- Possible solutions include conducting further studies on waste streams to better define the presence of the P4 or defining a different threshold other than LLD




---

---

---

---

---

---

---

---

### PERFORMANCE ASSESSMENT

---

---

---

---

---

---

---

---

### Performance Assessment

- Initial modeling done using a single simple deterministic model governed by the site conceptual model (2004)
  - Identified <sup>14</sup>C, <sup>99</sup>Tc, and <sup>129</sup>I as radionuclides that could potentially cause doses to exceed the 25 mrem/yr limit specified in the performance objectives
  - <sup>14</sup>C limit prescribed in the license for both the CWF and FWF
  - <sup>99</sup>Tc and <sup>129</sup>I limits prescribed in the license for the FWF
- Worker doses and accidents were evaluated using Microshield




---

---

---

---

---

---

---

---

### Performance Assessment (con't)

- Model evolution uses a probabilistic approach and consists of five parts:
  1. Infiltration model – employs HYDRUS to develop a range of infiltration rates with inputs (hydraulic head) obtained from MODFLOW-SURFACT
  2. Groundwater transport model – employs the use of HYDRUS to provide a time-history of radionuclide concentrations in groundwater
  3. Dose Model – employs the use of GoldSim to provide doses to a receptor from radionuclide concentrations in air, water, and soil
  4. Air transport model – employs the use of AERMOD to determine inhalation doses to a receptor at the site boundary
  5. Worker dose model – employs the use of Microshield to determine potential doses to workers during operations




---

---

---

---

---

---

---

---

### Performance Assessment (con't)

- Approach consistent with current Part 61 requirements with some minor differences
  - Period of performance not specified in Part 61
  - NUREG-1573 recommends a 10,000 year time frame for both period of performance and time of compliance, excluding large quantities of depleted uranium (DU) and long-lived transuranics
  - Texas rules require a period of a minimum of 1,000 years or until the time the peak dose occurs, whichever is longer, as the period of analysis to demonstrate the relationship of site suitability to the performance objectives
  - The TCEQ is currently evaluating receipt and disposal of DU




---

---

---

---

---

---

---

---



### The Current Texas Performance Assessment

- The PA constructed for the Texas disposal site recommended a time of compliance of 50,000 years. This time was chosen for several reasons:
  - To capture the full range of doses from more mobile long-lived radionuclides (i.e., <sup>14</sup>C, <sup>99</sup>Tc, and <sup>129</sup>I, and <sup>36</sup>Cl) in a complex geochemical environment
  - Because of the difficulties in predicting erosion rates and the effects on dose over long time frames
  - The approximate time at which in-growth of progeny from DU and TRU can become significant contributors to dose
- The license requires an annual performance assessment update using more realistic and flexible models/codes that are capable of incorporating new site-specific data as well as an evolving source term




---

---

---

---

---

---

---

---

---

---

### DISPOSAL RATES

---

---

---

---

---

---

---

---

---

---

### Interim Disposal Rates

- Interim disposal rates established by the TCEQ in August 2011 for the CWF only
- Establishes a base rate by volume, per cubic foot; by radioactivity, per curie; and surcharges to the base rate related to relative hazard for each waste shipment. Additionally, all waste shipments are subject to state fees.  
[http://www.tceq.texas.gov/assets/public/permitting/rad/rate\\_schedule/ED%20Interim%20Disposal%20Rate\\_08252011.pdf](http://www.tceq.texas.gov/assets/public/permitting/rad/rate_schedule/ED%20Interim%20Disposal%20Rate_08252011.pdf)
- Serve as a maximum charge for compact generators
- Serve as a minimum charge for out-of-compact generators
- The site operator negotiates a contract rate within the scope of the interim rates




---

---

---

---

---

---

---

---

---

---

### Final Disposal Rates

- In February 2012 the TCEQ published the recommended final rate schedule in the Texas Register
- The TCEQ received several requests for a contested case hearing
- In May 2012 the case was referred to the State Office of Administrative Hearings
- After brief negotiations all parties withdrew from the rate case and it was remanded back to the TCEQ for expedited rulemaking




---

---

---

---

---

---

---

---

### PHOTOGRAPHS

---

---

---

---

---

---

---

---



**Aerial Photo Taken January 2012 by WCS**  
 Oblique photograph was taken looking to the north, with Stateline Road along the west (left) & Hwy 176 in the foreground (right), encompassing all the facilities at the WCS site in Andrews County Texas




---

---

---

---

---

---

---

---



**Aerial Photo Taken August 2011 by WCS**  
Oblique photograph was taken looking to the southeast showing the Compact Waste Facility (center) and support facilities under construction



---

---

---

---

---

---

---

---



**Aerial Photo Taken August 2011 by WCS**  
Oblique photograph was taken looking to the north showing the Federal Waste Facility (center) & the Compact Waste Facility (right) & support facilities under construction



---

---

---

---

---

---

---

---

### Questions?

Michael S. Aplin, Manager  
Radioactive Material Licensing Section  
Radioactive Materials Division, Office of Waste  
Texas Commission on Environmental Quality  
Direct Phone Line: (512) 239-1792  
Direct Email: [mike.aplin@tceq.texas.gov](mailto:mike.aplin@tceq.texas.gov)  
Main Phone Line: (512) 239-6466  
Division Email: [RADMAT@tceq.texas.gov](mailto:RADMAT@tceq.texas.gov)



---

---

---

---

---

---

---

---