




**WCS**

WASTE CONTROL SPECIALISTS

**WCS Capacity Overview for TLLRWDC**  
July 12, 2018



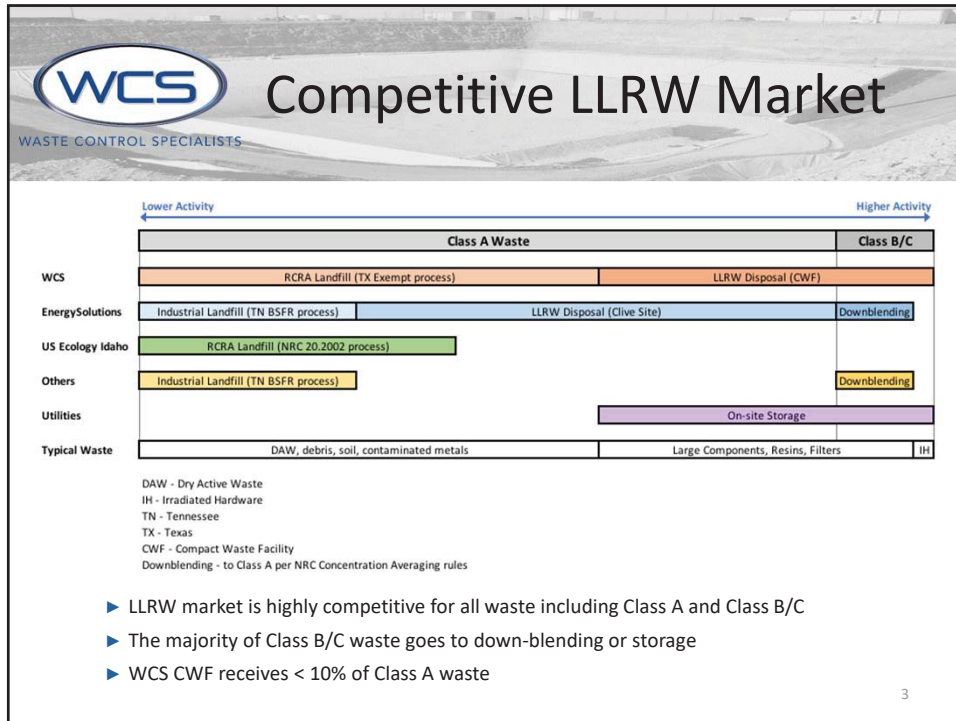
**LLRW Disposal has Changed!**

WASTE CONTROL SPECIALISTS

- Texas LLRW Disposal Authority – 1981
- Envirocare Class A License Change - 2001
- Barnwell closure to out of compact waste - 2008
- BSFR and 10 CFR 20.2002 LAW programs - various
- WCS Compact Waste Facility (CWF) startup - 2012
- Semprasafe JV for resins – 2012
- WCS Exempt process for LAW – 2014
- NRC BTP on expanded concentration averaging – 2015
- Filter downblending by WMG & ES – 2015/2016


*Bottom Line: Many options exist for disposal of LLRW*

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## CWF Licensed Disposal Capacity

**TX Compact Waste Disposal Facility (CWF):**


- 9,000,000 cubic feet and 3,890,000 curies (decay corrected)
- Increase to 8,000,000 Ci (decay corrected) by minor license amendment (if needed)
- Actual airspace is 4x that size to accommodate MCCs, backfill, etc.
- Currently in Phase 1 of 8
- Phase 1 holds approximately 475,000 ft<sup>3</sup> of waste
- To date we have disposed of approximately 120,000 ft<sup>3</sup> (5 years)
- Phase 2a will hold approximately 425,000 ft<sup>3</sup> of waste

**License Term**

- September 2024 (15 years) with provision for 10-year renewals thereafter

*Ci = curies      ft<sup>3</sup> = cubic feet*

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## CWF Licensed Disposal Import Limits

**TX Compact Waste Disposal Facility (CWF):**

- 9,000,000 ft<sup>3</sup> current licensed capacity
- 3,890,000 Ci (decay corrected), may increase up to 8,000,000 Ci (decay corrected) by minor license amendment


**Import limits (TX H&S Code 401.207)**

- 693,000 ft<sup>3</sup> (30% of initial licensed capacity of 2,310,000 ft<sup>3</sup>), 7.7% of current licensed capacity
- 275,000 Ci/y
- 1,167,000 Ci (30% of original Ci capacity), 15% of allowed Ci capacity

*Ci = curies      ft<sup>3</sup> = cubic feet*

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## Low Activity Radioactive Waste

- **Hazardous Waste Disposal Facility:**
  - Over 60,000,000 cubic feet of currently permitted capacity, with space for significant expansion
  - Approved exemption process allows low activity waste (lowest 10% of Class A LLRW) to be disposed in the permitted Hazardous Waste landfill
  - Provides efficient management of large-volume and low activity waste streams
  - Lower risk than BSFR disposal in municipal landfills
  - Cost-competitive with other alternatives
  - Currently in use for both operational and decommissioning waste

More than **90%** of decommissioning waste will qualify for exemption


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## Example - D&D Disposal Volumes

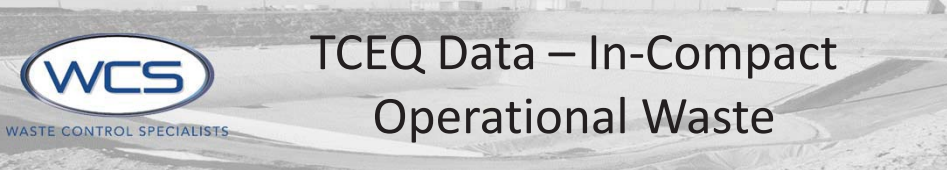
D&D Volume Estimates		
(cubic feet or waste)	Single Unit Reactor	
<b>Compact Waste Facility</b>		
Large Components	40,000	
Class A	75,000	
Class B&C	1,000	
Class B&C Irradiated Hardware	1,000	
<b>CWF Total</b>	<b>117,000</b>	<b>7%</b>
<b>Low Activity Waste Facility / Exempt</b>		
LAW Large Components	100,000	
LAW Soil & Debris	1,500,000	
<b>LAW Total</b>	<b>1,600,000</b>	<b>93%</b>

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## HOW MUCH SPACE IS NEEDED IN THE CWF FOR IN-COMPACT GENERATORS?

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## TCEQ Data – In-Compact Operational Waste

	Texas Compact Generation		CWF Disposal	
	ft <sup>3</sup> /yr	Ci/yr	ft <sup>3</sup> /yr	Ci/yr
Class A LLRW	7,190	106	2,754	214
All Classes LLRW	9,639	1,053	3,818	1,083

- Annual In-Compact operational LLRW for WCS disposal (3,818 ft<sup>3</sup>) is <.1% of available CWF disposal volume (9,000,000 ft<sup>3</sup>)
- About 40% of In-Compact LLRW is disposed at the CWF
- TCEQ historical estimates indicate that the majority of In-Compact operational LLRW is disposed at other than the CWF

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## WCS Data – In-Compact Disposal Volumes at WCS

All Texas Compact Utilities						
(cubic feet)	2013	2014	2015	2016	2017	Average
A	3,067	2,742	1,009	2,222	1,244	2,057
B	947	1,805	962	481	575	954
C	0	120	0	472	241	167
<b>Total</b>	<b>4,014</b>	<b>4,667</b>	<b>1,971</b>	<b>3,175</b>	<b>2,060</b>	<b>3,177</b>

**CWF Disposal for all Compact NPPs averages:**  
**Volume = 3,200 ft<sup>3</sup>/y**  
**Revenue = \$1.4 million/y**

***In-Compact Operational Disposal Volumes are relatively small***

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## TCEQ Estimate of In-Compact Waste Generation

*Current TCEQ estimates of operational & decommissioning volumes*

Texas Compact Generators	As-generated Volume (ft <sup>3</sup> )	Radioactivity (Ci)	As-disposed Volume (ft <sup>3</sup> )
Utility Operational	571,175	16,317	159,500
Utility Decommissioning	2,143,360	661,317	822,783
Non-Utility	193,620	7,216	54,068
<b>Sub totals</b>	<b>2,908,155</b>	<b>684,850</b>	<b>1,036,351</b>

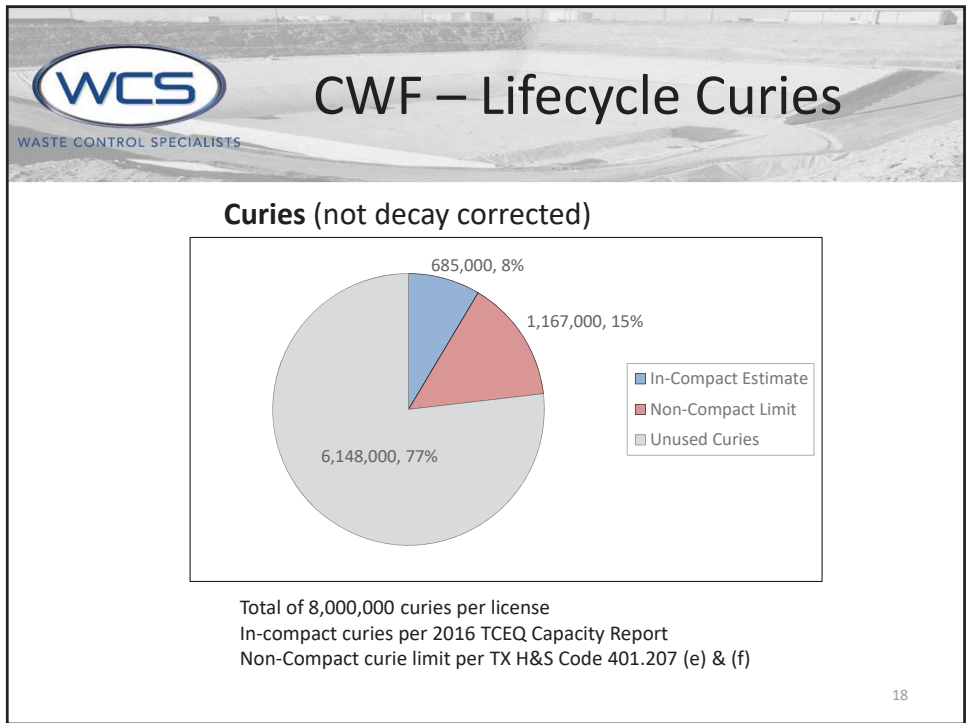
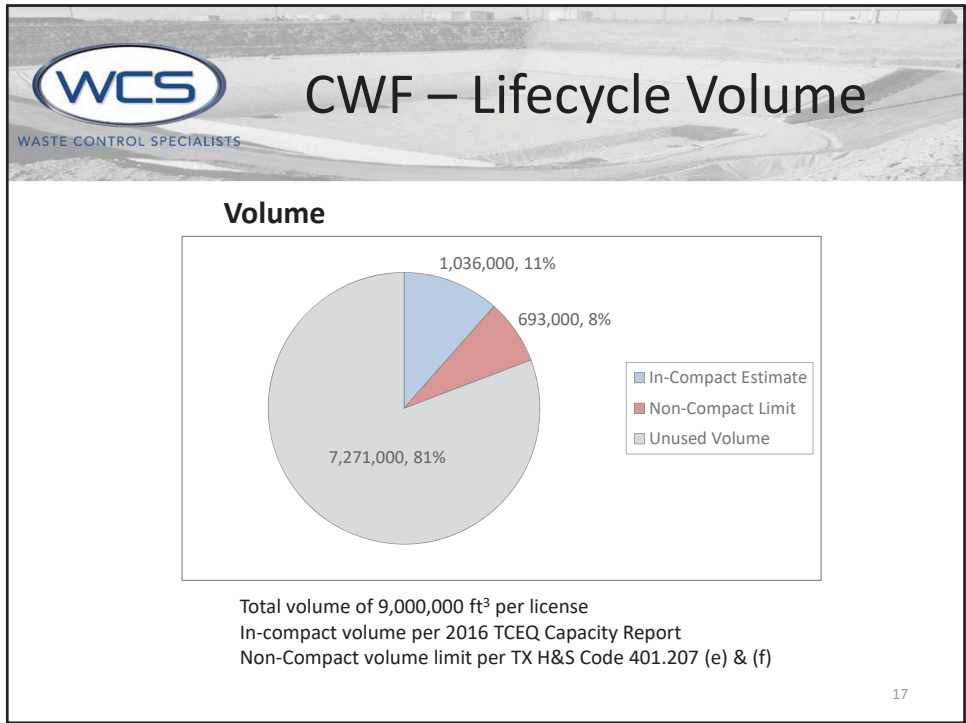
Assumptions:  
 (1) Total of all in-compact waste through 2044  
 (2) No new NPP construction

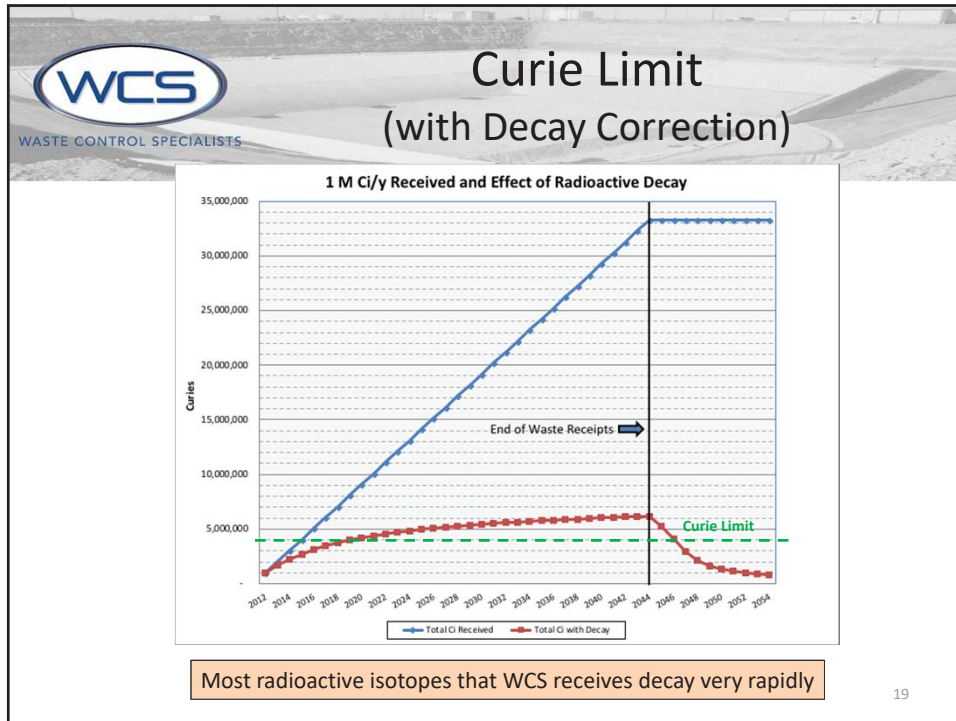
“Texas Compact utility operations Class A LLRW may have other disposal pathways besides the CWF. Texas generators have consistently sought export authorization for disposal pathways outside of the Texas Compact.”

Source: TCEQ Report, Capacity Report for Low-Level Radioactive Waste, page 10-11, 2016.


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- Using same model as the performance assessment with same distribution of isotopes
- Most limiting point of compliance is the intruder-driller mud-pit scenario at approximately 1,000 years
- The curie limit of the CWF using these assumptions would be **more than a billion curies** before exceeding the dose limit to the intruder-driller



## Licensed vs. Constructed Disposal Capacity

- It is most cost efficient to construct disposal space as it is needed
- Typical cell expansion phase will be < 500,000 ft<sup>3</sup> at a time
- Time from start of construction of a cell expansion to readiness for waste placement is 9-12 months
- The first phase of 475,000 ft<sup>3</sup> will last about 8 years (from 2013-2021) and will include the VY decommissioning waste
- “As constructed” cost is millions of dollars per cell expansion phase
- Constructed space must be continuously maintained and requires additional bonding and cash reserves based on capacity


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## Benefits of LLRW Imports

- Import revenues cover most of the cost of the site, reducing LLRW disposal costs for in-compact generators
- Competitive market-based pricing (rather than a rate case) avoids the need for a protracted and expensive ratemaking
- Financial viability of the site ensures the CWF will be available when needed for in-compact decommissioning

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## Conclusions

- The LLRW market has changed, and only a small percentage of LLRW requires Compact Waste Facility (CWF) disposal
- Low Activity Waste (LAW) facilities can dispose of over 90% of decommissioning LLRW
- Operational volumes from in-compact are relatively small
- The 2016 TCEQ capacity report estimates a total of 1,036,000 ft<sup>3</sup> of in-compact LLRW for disposal at the CWF (operational and decommissioning)
- Waste imports benefit in-compact generators

Over 75% of the CWF space and curie capacity is not needed for in-compact LLRW and cannot currently be used for out-of-compact LLRW

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