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## Journey to Excellence Goal 2 & Enhanced Tank Waste Strategy

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## Agenda

- Journey to Excellence – Goal 2 on reducing EM's Life Cycle Costs
- Enhanced Tank Waste Strategy – What it is and what we need to do collectively to make this a reality
- Focus of the HLW Corporate Board for 2011
- Support from EM-TEG and EMAB

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Journey to Excellence - Goal 2

## Reduce Life-Cycle Costs and Accelerate Cleanup

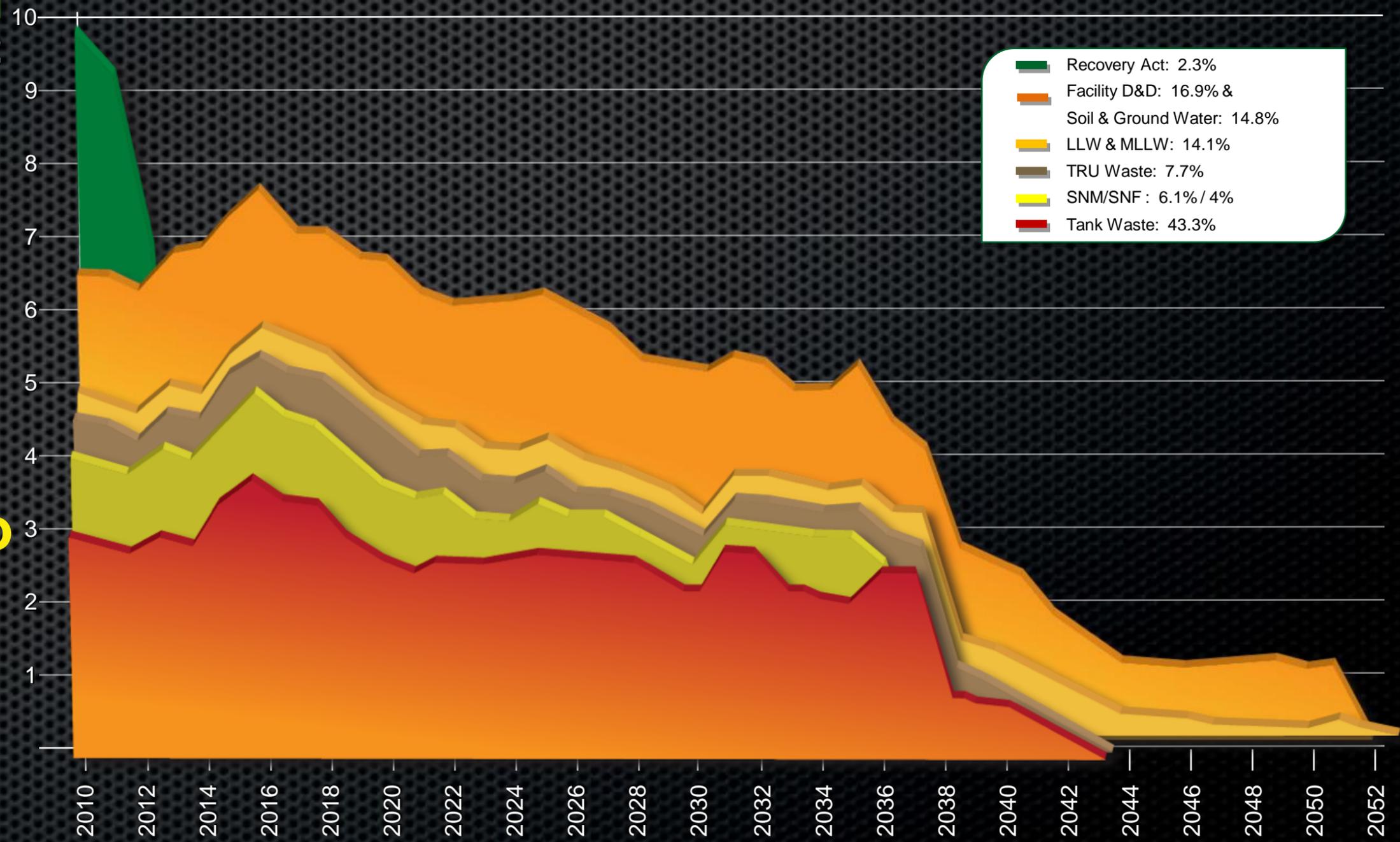
- ▶ EM's life-cycle cost ranges between \$190 to \$244 billion to complete EM's remaining mission
- ▶ EM's tank waste mission is critical path, accounts for >43% of the total EM cleanup cost, and is the major contributor to EM's cleanup liability
- ▶ **Focus** Technology Development and Deployment (TDD) **investments** to mature science & technology for tank waste processing, treatment, and waste loading
- ▶ Leverage Recovery Act and base funding to deploy mature tank waste processing technologies to enhance current tank waste cleanup approaches

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## Journey to Excellence - Goal 2 Life-cycle Costs Profile

**\$190 to  
\$244  
Billion  
to go**



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Journey to Excellence - Goal 2

## Reduce Life-cycle Costs



- ▶ Prioritize base, TDD and Recovery Act funds
- ▶ Integrate and manage the TDD investment from 2010 to 2018 and insert technologies at appropriate maturity.
- ▶ Use **National Academy of Sciences, Environmental Management Advisory Board, EM Technical Experts Group** to inform us on how best to achieve reductions in the life-cycle cost for the tank waste mission
- ▶ Use appropriate system planning models to demonstrate benefit of deploying state-of-the-art technologies to reduce the life-cycle cost

### Key Strategies

- ▶ **Accelerate tank waste cleanup by 6 years at SRS and 7 years at Hanford and reduce life-cycle cost by up to \$19B**
- ▶ End of FY 2011, develop/modify system-planning tool
- ▶ End of FY 2012, reflect new transformational technologies in SRS and Hanford baselines

### Key Success Indicators

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**Journey to Excellence - Goal 2**

## **Enhanced Tank Waste Key Strategies**

- ▶ At-Tank/In-Tank treatment solutions for supplemental treatment capacity
- ▶ Fluidized Bed Steam Reformer (FBSR) vs upgrading Effluent Treatment Facility
- ▶ FBSR as supplemental treatment vs 2<sup>nd</sup> LAW Facility
- ▶ HLW improved vitrification capacity (1.5 – 2 X) starting in 2025 using combination of enhanced glass formulation and melter performance
- ▶ Single Shell Tank (SST) Consolidation
- ▶ Hard Heel Retrieval Technology
- ▶ Redundant and flexible evaporation capability
- ▶ Contact handled waste (11 tanks) dried, packaged, stored onsite pending offsite disposition

**Key Strategies**

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## Journey to Excellence - Goal 2 Enhanced Tank Waste Technology Needs

- ▶ Small Column Ion Exchange (SCIX) and Rotary Microfilter (RMF) at-tank/in-tank treatment solutions
- ▶ FBSR as secondary waste form and supplemental LAW treatment option
- ▶ Secondary waste recycle, next generation solvent
- ▶ Next generation melters and enhanced glass formulations
  - Advanced Joule-heated melters
  - Cold Crucible Induction Melter (CCIM)
  - Iron Phosphate glass
- ▶ Melter cold cap chemistry
- ▶ SST Integrity non-destructive examination
- ▶ Chemical cleaning techniques
- ▶ Wipe Film Evaporator (WFE)
- ▶ Solids drying and packaging unit

Key Technology Needs

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Journey to Excellence - Goal 2

## EM's FY2011 Tank Waste Focus



Established Enhanced Tank Waste Strategy (ETWS) team

- ▶ Aligning scope, funding and plans to ensure clear focus
- ▶ Developing integrated schedule of all base, ARRA and TDD activities that support the ETWS scope
- ▶ Engaging HLW Corp Board, EM-TEG, EMAB Tank Waste Subcommittee, regulators and stakeholders to ensure credible results from technology testing
- ▶ Leveraging TDD, CRESO, Universities and SRS, Hanford and Idaho project funding to prioritize resources

### ETWS Near Term Actions

- ▶ Performing critical waste form tests
- ▶ Address several technical issues to ensure well-developed information available for decision makers
- ▶ Completing actions to support secondary waste and supplemental treatment down select
- ▶ Alignment of PA and EIS with ETWS

### ETWS Longer Term Actions

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## Questions Challenging Near Term Decisions



- ▶ Tc-99 drives residual risk in Hanford IDF performance assessments
- ▶ ILAW glass chosen largely because its durability limits Tc-99 leaching
- ▶ Hanford regulator expectation all ILAW “as good as glass”
- ▶ SST consolidation/staging tied to demonstrating integrity
- ▶ ETWS drives retrieval rates as critical path vs treatment

### Facts/Assumptions

- ▶ Single-pass Tc-99 retention in ILAW glass – large uncertainties
- ▶ Recycling Tc-99 has not been demonstrated; may cause other problems
- ▶ Effects of bubblers to improve waste loading may have negative effects on Tc-99 retention
- ▶ 2<sup>nd</sup> LAW recycling impacts on WTP, secondary waste and overall mission duration uncertain
- ▶ Partitioning of Tc-99 to secondary waste uncertain
- ▶ Tc-99 partition between LAW and Supplemental Treatment uncertain

### Questions/Focus of this Meeting

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## EM-TEG Near Term Support

- ▶ Task 1 – Low Activity Vitrification Waste Loading Evaluation
  - Evaluate major chemical loading for LAW, 2<sup>nd</sup> LAW, sec. waste
  - Identify unaddressed risks in baseline assumptions used in WTP/TOC models and impacts on LAW treatment projections
- ▶ Task 2 – LAW Tc-99 Capture in LAW Glass
  - Determine if Tc-99 retention assumptions in LAW, 2<sup>nd</sup> LAW, and secondary waste are defensible
- ▶ Task 3 – Tc-99 in Other Secondary Wastes
  - Determine if unaccounted Tc-99 could deposit in process equipment or canisters, increasing risks beyond what is analyzed in the Performance Assessment and EIS
- ▶ Task 4 – Hanford Tank Waste LAW Samples for FBSR Testing
  - Evaluate adequacy of FBSR waste form qualification process to support FBSR treatment of LAW and secondary waste

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## EMAB Support

- ▶ Task 1 – Review Modeling for Life-Cycle Analysis
- ▶ Task 2 – Assess Candidate LAW Forms
- ▶ Task 3 – Assess At-Tank/In-Tank Technologies
- ▶ Task 4 – Evaluate Various Melter Technologies
- ▶ Task 5 – Evaluate Reliability of Waste Delivery Plans
- ▶ Task 6 – Identify Other Tank Waste Vulnerabilities

EMAB Tasks

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## Summary

- Tank Waste Mission drives the EM LCC
- ETWS, if successful, offers significant opportunity to reduce EM's LCC
- Several Questions to be answered, Issues to be addressed, and Work to be done to make this a reality
- Engage Regulators, Tribes, and Stakeholders
- HLW Corporate Board, EM-TEG, and EMAB to assist EM Leadership in this Journey to Excellence