



U.S. DEPARTMENT OF **ENERGY**

Overview of DOE's Office of Environmental Management

Tank Waste and Spent (Used) Fuel Management

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Deputy Assistant Secretary
for Technical and Regulatory Support**

**January 9, 2012
NWTRB Winter 2012 Meeting**



EM Environmental Management

safety ♦ performance ♦ cleanup ♦ closure

www.em.doe.gov

EM's Strategic Context

EM's Mission

To safely transform the environmental legacy of the Cold War into assets available for the Nation's future by completing quality cleanup work on schedule and within cost, delivering demonstrated value to the American taxpayer.

EM's Vision

To be viewed as one of the best managed government programs and the employer of choice in the Federal Government.

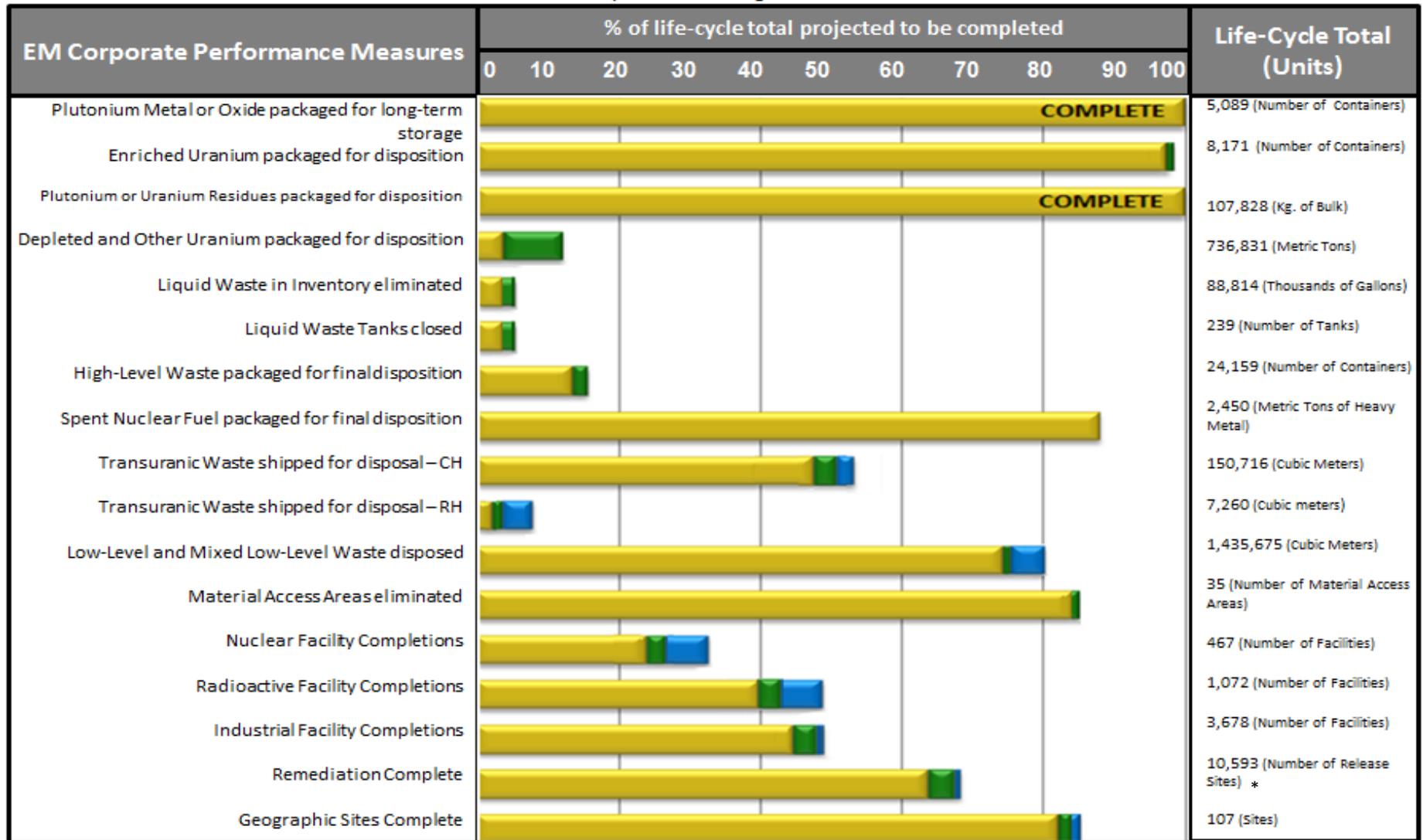
EM Programmatic Priorities

- Activities to maintain a **safe, secure, and compliant** posture in the EM complex
- **Radioactive tank waste** stabilization, treatment, and disposal
- **Spent (used) nuclear fuel** storage, receipt, and disposition
- **Special nuclear material** consolidation, processing, and disposition
- **Transuranic** and **mixed/low-level waste** disposition
- **Soil and groundwater** remediation
- Excess facilities **decontamination and decommissioning (D&D)**



Corporate Performance Metric Life-Cycle Chart

Completions through FY 2012



Legend

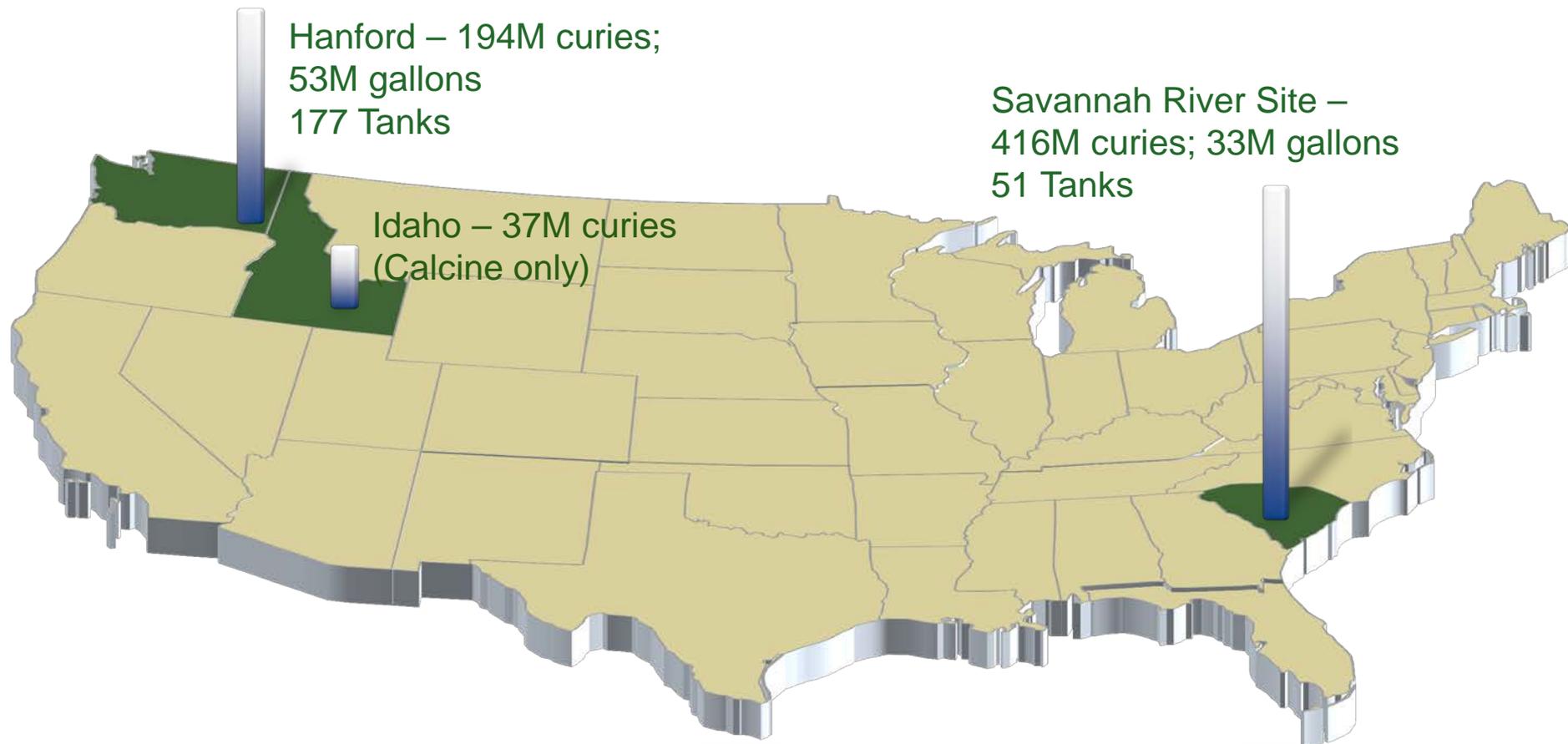
 EM Actuals to Date (including FY 2010 Actuals for both ARRA and BASE)

 FY 2011 and FY 2012 Targets - BASE

 FY 2011 and FY 2012 Targets - ARRA

* Original 110 Sites changed legislatively in 1998. Current inventory is 107 Sites.

EM stores and treats HLW/tank waste

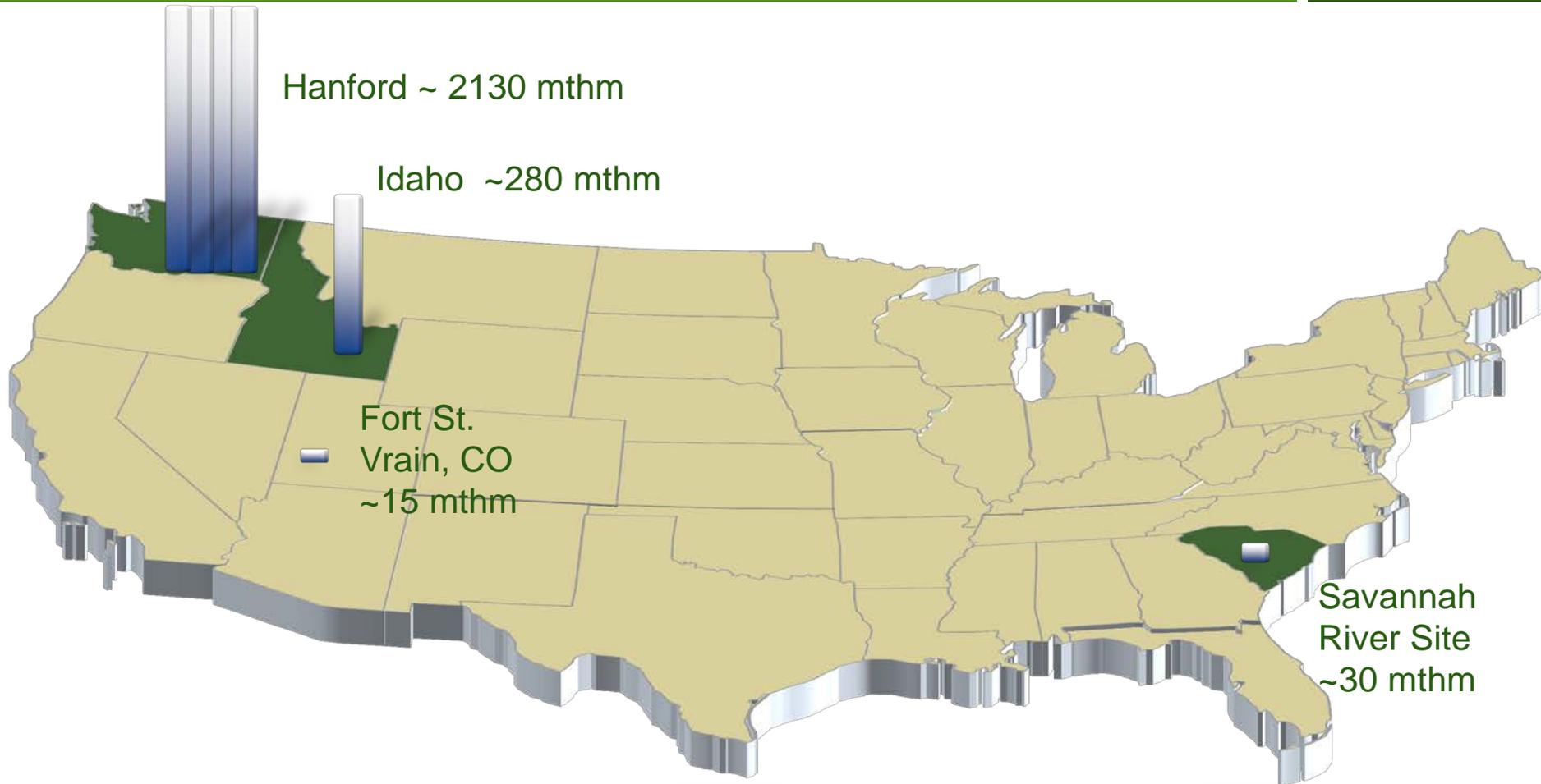


EM Tank Waste Mission and Vision

- **Highest priority is to ensure safe interim storage of the tank wastes (and other high level waste (HLW) forms) pending their treatment and/or disposal**
 - Retrieving waste from single-shelled tanks or known leaking tanks
- **Construct the treatment facilities and systems necessary to prepare the wastes for cost-effective and secure storage pending availability**
 - West Valley Demonstration Plant Vitrification Plant – operational in 1996, completed in 2002
 - Savannah River Defense Waste Processing Facility – operational in 1996
 - Idaho Sodium Bearing Waste Treatment Facility – construction complete in 2011
 - Two others in process, and a third in planning
- **Process wastes to a more stable form**
 - 275 HLW canisters in storage at West Valley
 - Over 3,500 canisters produced at Savannah River Site
- **Empty and close tanks**
 - Completed 16 tank retrievals and 9 tank closures
- **Utilize Science and Technology to resolve risks, decrease cost and schedule**



EM is safely storing spent nuclear fuel



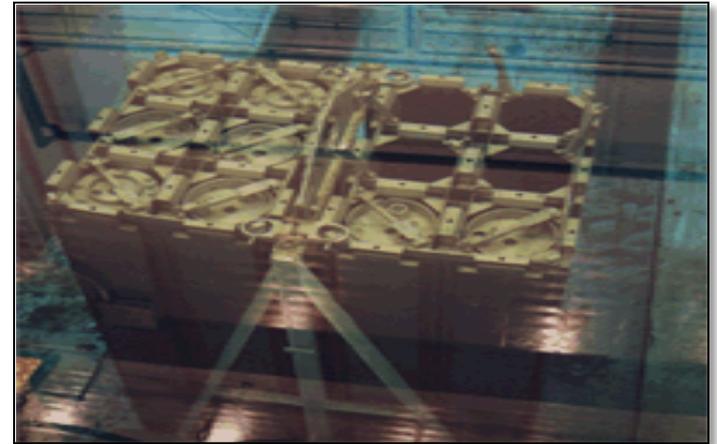
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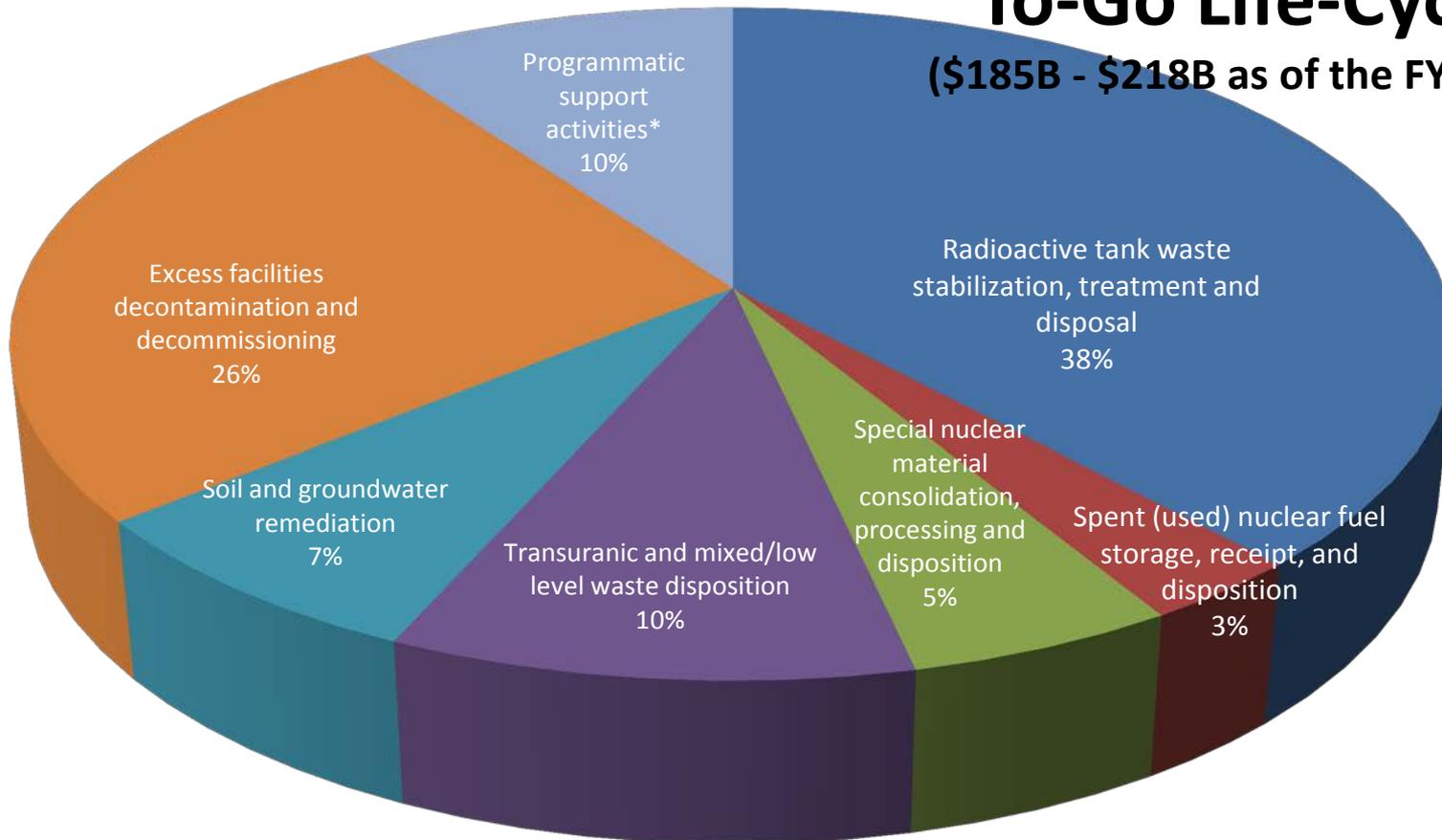
Spent (Used) Fuel Mission & Vision

- Continued safe and secure storage and management of fuel inventories
 - EM has addressed the greatest risks of its spent fuel inventories
- Work with all stakeholders and comply with legal agreements
- Implement new technologies to improve safety and performance
- Continue receipt of FRR/DRR SNF through 2019
- Evaluate disposition options for Al-clad SNF
- Evaluate and plan for future SNF packaging requirements



Elements of EM's Life-Cycle Cost

“To-Go Life-Cycle Cost” (\$185B - \$218B as of the FY 2012 Request)



•Program Direction, Program Support, Community & Regulatory Support, Technology Development & Deployment, and Post-Closure Administration



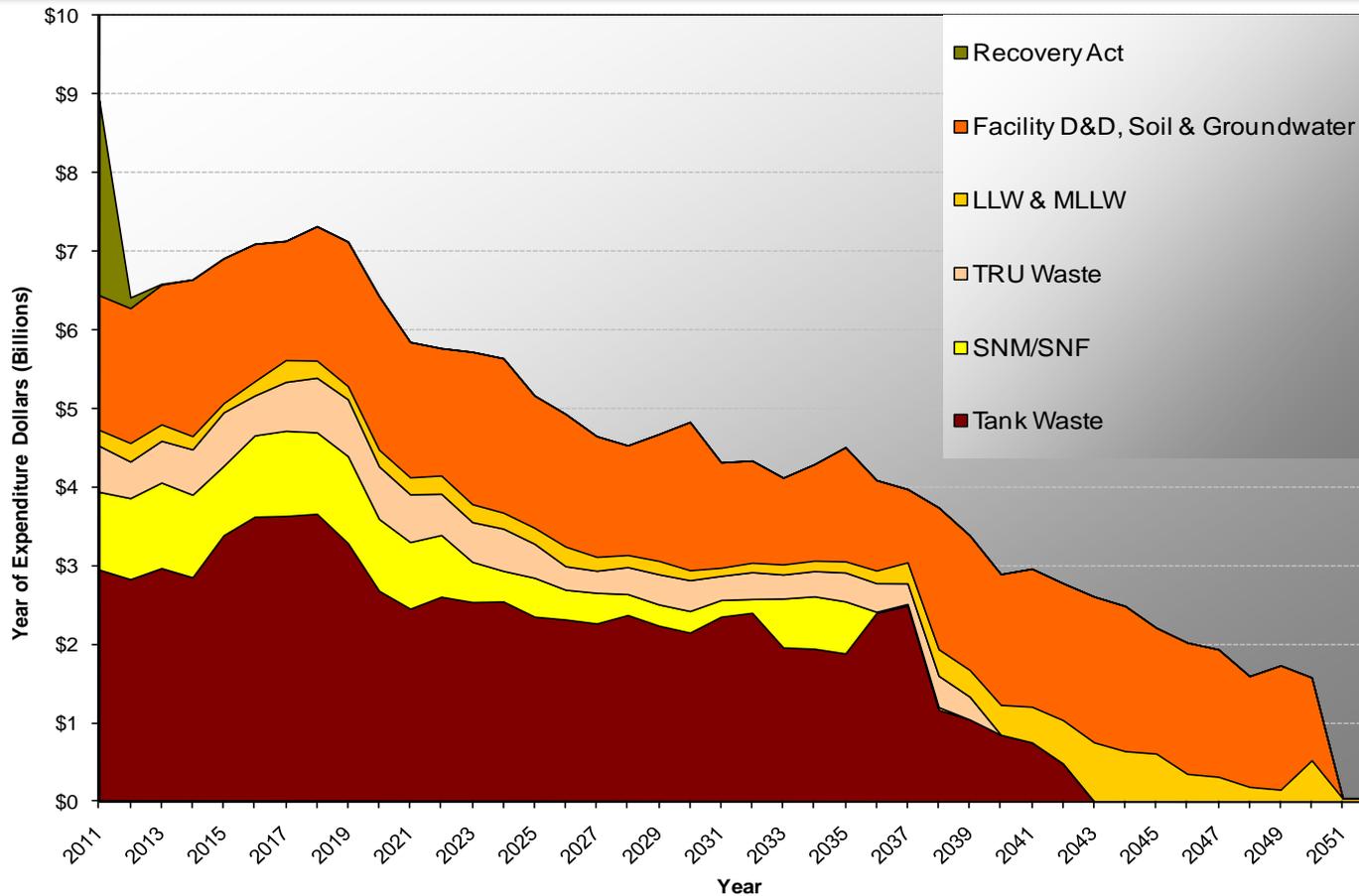
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Life-Cycle Cost Profile Over Time

Environmental Management Costs by Program Area



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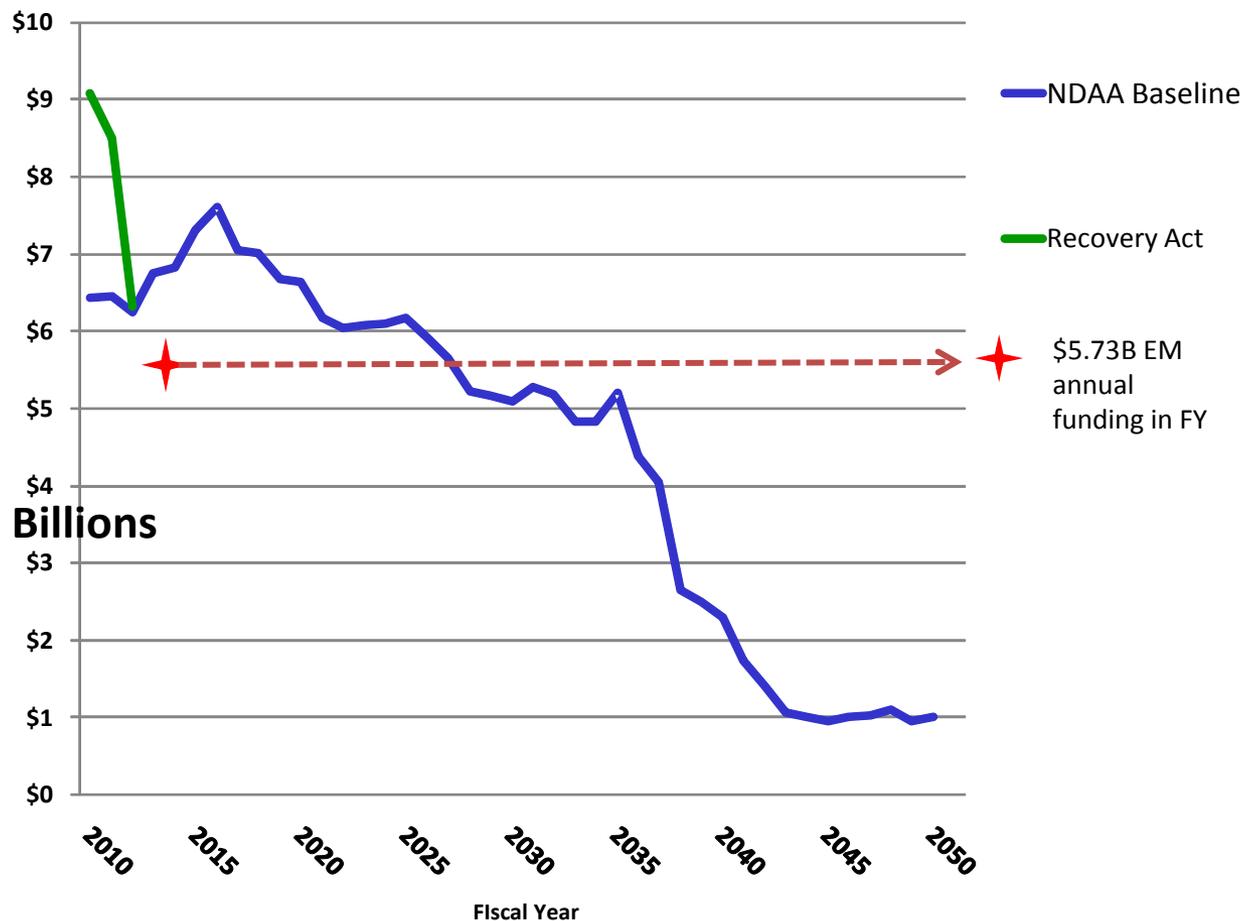
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EM Budgetary Outlook

Administration announced no increase in discretionary non-defense funding and a 5% rescission

EM's Baseline cost is higher than best-case budget projections —

Strategic thinking about investments is critical to moving program forward



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Goal #1 – Complete the three major tank waste treatment projects within the approved baselines

Sodium Bearing Waste Facility, ID

Construction complete 2011 (operational 2012)



Salt Waste Processing Facility, SC

Construction complete 2014 (operational 2014)



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Goal #1 – Complete the three major tank waste treatment projects within the approved baselines

Waste Treatment Plant, WA

Construction complete 2016 (operational 2019)



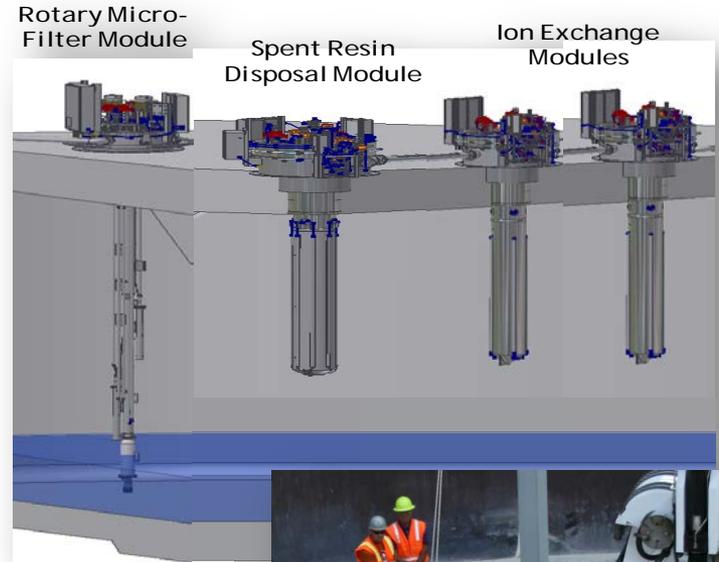
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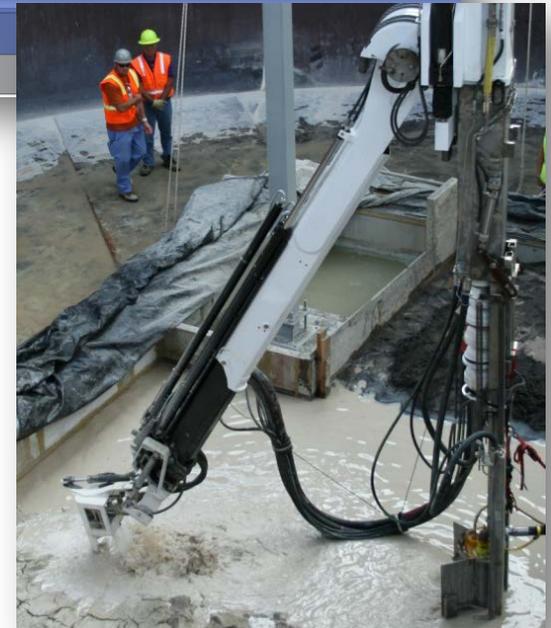
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Goal # 2 – Reduce EM life-cycle cost by up to \$43B & accelerate the cleanup of the Cold War legacy

- EM has identified targeted investments in science and technology to improve on our program plans.
- A key component of this is the “Enhanced Tank Waste Strategy”



Fluidized Bed Steam Reformer



Planned and Potential Tank Waste Enhancements

- **Near Tank Processing** – provide capability near waste tanks to remove solids/radionuclides for processing as LAW and reduce overall treatment time
- **Advanced Melters** - investigate cold crucible melters, melter bubblers, and revised glass chemistry to achieve higher waste loading
- **Higher Waste Loading** – investigate glass formulations, new glasses (e.g., iron phosphate), grout, steam reforming, etc.
- **Alternative Treatment/Disposal Processes** – use steam reforming and evaporation followed by sodium silicate solidification to reduce waste volume.
- **Aluminum and Caustic Separation** - processes could reduced HLW fraction
- **HLW Mixing & Blending** - will minimize treated waste volume by mixing of compatible tank wastes.
- **Other** - waste staging, accelerated area closure, systems analysis



Enhanced Tank Waste Strategies Yield Large Life-Cycle Cost Savings

Strategy

Expected Benefit

1. At-Tank/Near-Tank Treatment

- In-tank solid-liquid separation and Cs137 removal using rotary microfiltration and small column ion exchange for pretreatment

\$1.65B Investment

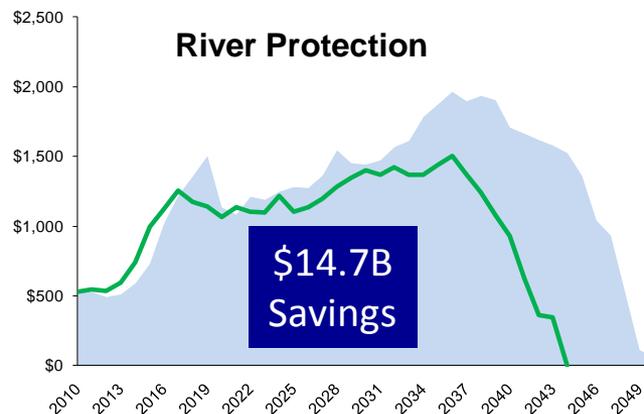
2. Next-generation Melters and Waste Loading Enhancements

- Design & commissioning of next-generation melter

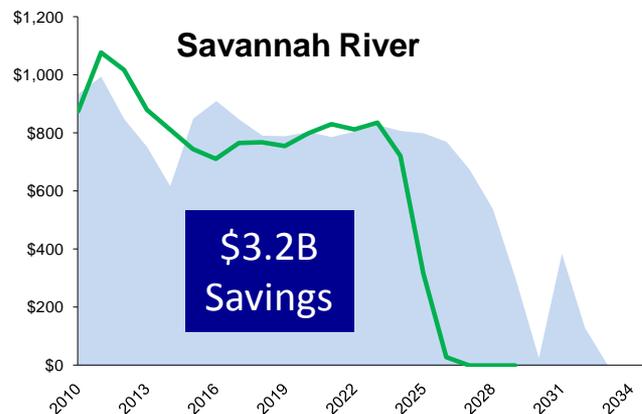
3. Advanced Separation Processes/ Alternative Treatment Disposal Processes

- Fluidized bed steam reforming for low activity waste treatment
- Advanced solvents for radionuclide solvent extraction

\$722M Investment



- Eliminates need for second LAW
- Completes single shell tank retrieval 6 years early
- Completes tank waste treatment 7 years early



- Closes high risk tanks 5 years early
- Completes tank waste treatment 6 years early



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In Closing...

- EM continues to safely retrieve and treat tank waste, other HLW forms and spent nuclear fuel for interim storage on-site
- We will complete construction and continuously optimize operations of its tank waste treatment systems
- We will continue to share experiences, lessons learned, technologies and operational improvements among the tank waste sites and projects
- We remain focused on ensuring its treatment methods will meet requirements for final disposal
- We will continue to support the Blue Ribbon Commission and the Secretary, as the pending recommendations of the Commission are considered
- DOE remains committed to fulfilling its compliance commitments

