U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

Tank Waste Program Reviews

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Tank Waste Program Summary

- Largest portion of Environmental Management (EM) budget
- Longest duration cleanup mission = 35 years
- Greatest technical challenges

Radioactive Tank Waste
$ 1,933M / 34%

EM's FY 2014 Budget Request - $5.622 Billion Total

Tank Waste Challenges

- Reduce the technical uncertainty associated with the treatment and disposal of tank waste, in particular at the Waste Treatment Plant;
- Accelerate treatment and processing schedules;
- Reduce or eliminate the need for additional large processing facilities
- Develop more effective and efficient treatment and processing technologies;
- Final disposal of High Level Waste; and
- Maintain core technical competencies at national laboratories and other institutions

Reviews Offer Assistance and Perspective

2002 EM Top-to-Bottom Review
2006 External Flowsheet Review Team (EFRT) – Final Report
2006 EFRT – Background Report
2007 Technology Readiness Assessment (TRA)
2007 National Academy of Sciences (NAS)
2009 External Technical Review (ETR)
2009 Construction Project Review (CPR)
2009 NAS – Technology Roadmap
2010 Integrated Project Team – Vol.1 and 2
2010 CPR May
2010 CPR November
2010 CRESP – Pulse Jet Mixer
2010 Defense Nuclear Facility Safety Board (DNFSB) 2010-2
2010 EM Advisory Board- Tank Waste Subcommittee (EMAB-TWS)
2010 Bechtel Safety Culture Review

Bold = External

2010 Health, Safety & Security Safety Culture Review
2010 NAS Workshop
2011 Government Accountability Office -11-143
2011 DNFSB 2011-1
2011 EM-Technical Expert Group
2011 EMAB- TWS
2011 Secretarial Review of EM Projects
2011 NAS – Waste Forms
2011 CPR
2012 DOE Inspector General
2012 DNFSB Report to Congress
2012 HSS Safety Culture Review
2012 DNFSB - Erosion
2012 Differing Professional Opinion
2013 Secretarial Review of WTP

EMAB – EM TWS Report WTP-001

- EMAB – EM TWS Report for Waste Treatment Plant, 9/30/2010
  - Charge 1: Verification of Closure of WTP External Flowsheet Review Team Issues
  - Charge 2: WTP Technical Design review
  - Charge 3: WTP Potential Improvements
- EM Response from Dr. Ines Triay, Assistant Secretary for EM, 1/24/2011
  - Charge 1: Ten recommendations provided to Contractor for consideration and review with Federal Project Director (FPD) for implementation.
  - Charge 2: Five recommendations addressing stronger and more unified “owner” role for DOE implemented through actions by the Deputy Secretary.
  - Charge 3: Five recommendations addressing system safety and project accountability also implemented through actions by the Deputy Secretary.
- Key Message Received: Need strong DOE owner with single point authority and oversight under a unified baseline

EMAB – EM TWS Report #003

- EMAB – EM TWS Report for SRS/Hanford Tank Waste, 6/29/2011
  - Charge 1: Modeling for Life Cycle Analysis
  - Charge 2: Assess Candidate Low-Activity Waste Forms
  - Charge 3: Assess At-Tank or In-Tank Candidate Technologies for Augmenting Planed Waste Pretreatment Capabilities
  - Charge 4: Evaluate Various Melter Technologies
  - Charge 5: Evaluate the Reliability of Waste Delivery Plans
  - Charge 6: Identify Other Tank Waste Vulnerabilities at SRS and Hanford
  - Charge 7: 2020 Vision, Early Startup of One (1) LAW Melter
  - Charge 8: Alternate Retrieval Strategies for the Hanford Waste Tanks
- EM Response from David Huizenga, Acting EM-1, 11/16/2011
  - Recommendations provided to SRS and Hanford for evaluation and implementation, as appropriate.
  - EM considered response as 'interim' pending site evaluation and implementation
- EM Follow-up Response from David Huizenga, 6/12/2013
  - Responds to four overarching recommendations and describes broader review

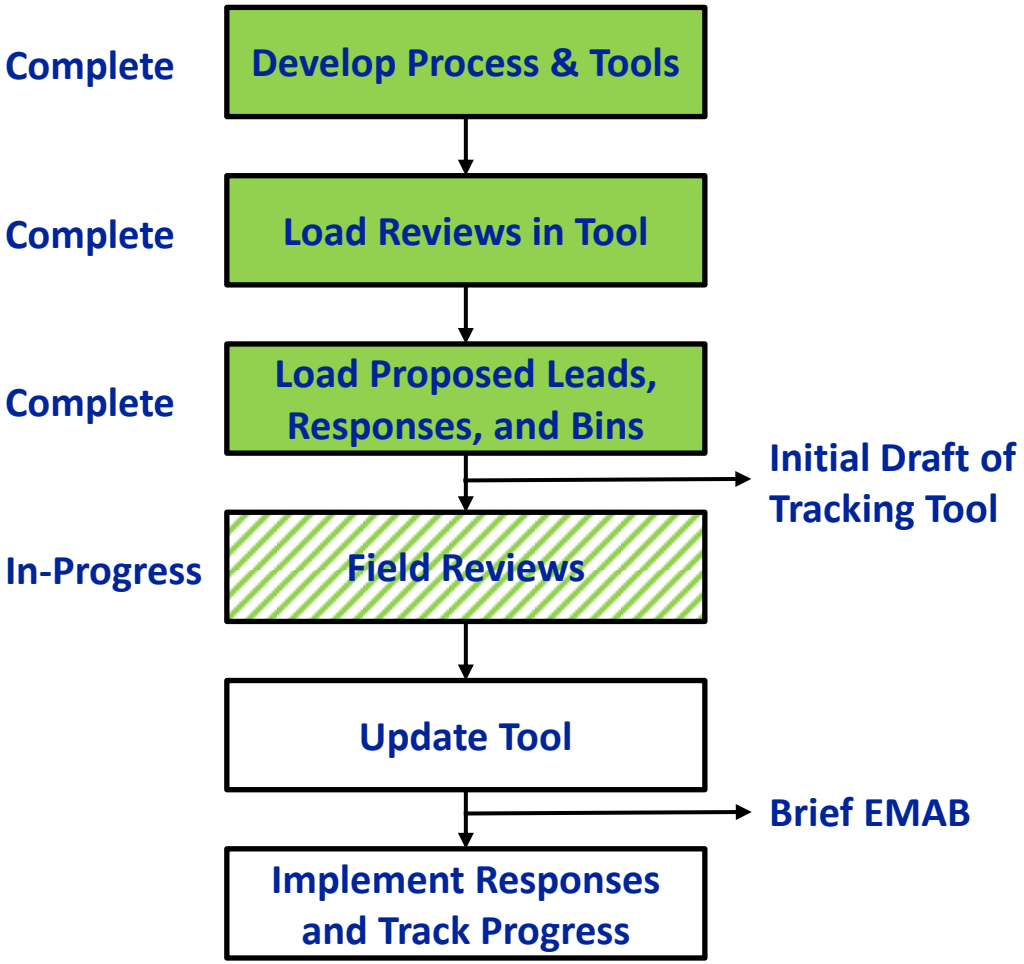
Tank Waste Corporate Board

- Tank Waste Corporate Board (TWCB) re-chartered in August 2012
  - Meet semi-annually, rotating between field locations
  - August 2012 – Idaho Falls; March 2013 - Savannah River; October 2013 - Hanford
- Focus for tank waste integration and collaboration
  - DOE and prime contractor representatives from HQ and field sites
  - National Laboratories
  - Invited participants and observers (e.g., Energy Facility Contractors Group, former TWSC members)
- Key Activities
  - Information exchange and Lessons Learned
  - Dialogue on difficult technical and policy issues
  - Charter working groups for further, detailed analysis and evaluation
  - Locus for “Review of Reviews” Evaluation

"Review of Reviews" Evaluation

- Many detailed programmatic and technical recommendations forwarded for field consideration (2009 – 2011), but action or status not recorded
- Significant program impacts from budget and DOE management changes
- Many similar, overlapping, or conflicting recommendations suggest need for comprehensive, integrated resolution
  - EM Tank Waste Strategy Review, EM Technical Expert Group (EM-TEG), May 2011
  - EM Tank Waste Subcommittee Report for SRS / Hanford Tank Waste Review, Environmental Management Advisory Board (EMAB), June 2011
  - Waste Forms Technology and Performance Final Report, National Academy of Sciences (NAS), 2011
  - DOE Needs a Comprehensive Strategy and Guidance on Computer Models that Support Environmental Cleanup Decisions, Government Accountability Office (GAO), February 2011
  - Better Information Needed on Waste Storage at DOE Sites as a Result of Yucca Mountain Shutdown, GAO, March 2011
  - Advice on the Department of Energy's Cleanup Technology Roadmap – Gaps and Bridges, NAS, 2009

Review of Reviews Approach



Topical Area Groupings

- Management
- Consult Others
- Risk/ Uncertainty/ Sensitivity/ Health
- System Plans
- Regulatory Approach
- Modeling
- Real Waste Testing
- Tank 48 (SRS)
- Analytical Capability
- At-Tank (Pre-Treatment)
- Cesium (Cs) Removal
- Melter / Glass
- Monosodium Titanate (MST)
- Processing
- Retrieval
- Solubility
- Technetium (Tc)
- Waste Forms
- Gas Retention
- Heel Removal / Robots

Categories for Statusing Recommendations

- Completed / Closed
- Agree - deferred for funding availability
- In-progress
- Not adopted
- On-going
- Recommendation will be used as input to reevaluation of strategy
- Technical Strategy Changed

Review Spreadsheet Tool

Review Org.	Recommend. #	Recommendation	Key Message	Primary Lead	Disposition or Action	Topical Area	Summary Proposed Action	Target Completion Date	Actual Completion Date
EMAB-TW	2011-OA-01	It is recommended that DOE seek (with Office of Management and Budget support) multi-year appropriations with no control points from Congress (versus year-to-year funding with control points) for mission-critical projects for both SRS and the Hanford Tank Farms Program.	Pursue multi-year TD funding	EM-20	DOE does not accept the recommendation as written; however EM strives for some flexibility. For example a single control point is being requested for WTP to provide greater flexibility.	01 Management - Budget	Not adopted		
		Standardize life cycle cost analysis							
EMAB-TW	2011-OA-02	It is recommended that DOE seek to standardize life cycle cost evaluations system-wide when evaluating alternatives for technology and/ treatment system capital projects, regardless of expenditure level.	Standardize cost evaluation approach for TD	EM-20	EM is pursuing this through a proposed initiative by the Tank Waste Corporate Board via preparation of a System Plan Guide.	01 Management - LCC	Recommendation will be used as input to reevaluation of strategy		

Column Header	Description
ID:	A unique identifier for each recommendation to be addressed by the tracking and implementation plan (initial list uses the applicable Report Rec. #)
Recommendation:	Verbatim recommendation from a particular report. The first row of a group of similar recommendations identified by color will be a descriptive summary of the group.
Key Message:	Summarizes Recommendation
Primary Lead:	The office (i.e. EM-20, -21, -23, ORP, and SR) that has responsibility for responding to the recommendation and ensuring actions are completed
Disposition or Action:	Detailed status or action already decided or underway
Topical Area:	Categorization of recommendation to facilitate resolution and tracking
Summary Proposed Action:	Summarizes disposition or action
Target Completion Date:	Planned date for resolution of recommendation
Actual Completion Date:	Actual date for resolution of recommendation

Preliminary Action Summary *

Summary Proposed Action	EMAB-TW Count	TEG Count	NAS-GAPs Count	NAS-Waste Count	GAO Count	Total
Completed / Closed	6	3	1	3	0	13
Agree - deferred for funding availability	1	20	3	1	5	30
In-progress	12	30	0	0	0	42
Not adopted	3	0	5	0	0	8
On-going	0	2	0	0	0	2
Recommendation will be used as input to reevaluation of strategy	23	39	14	6	0	82
Technical Strategy Changed	2	1	0	0	0	3
SubTotal Rec's from Review	47	95	23	10	5	180

* - Will be updated upon completion of field input

Status of TWS Recommendations

- Savannah River response examples
  - Through system planning, need for Tank 48 has been revised due to success with Actinide Removal Process / Modular Caustic Side Solvent Extraction Unit (EMAB-TWS-2011-05-E)
  - An options analysis for Small Column Ion Exchange (SCIX) treatment was completed and documented (EMAB-TWS-2011-06-B)
  - An External Technical Review (ETR) was completed in September 2011 to complete the technical evaluation for SCIX (EMAB-TWS-2011-03-E)
- Hanford response examples
  - Revised Waste Acceptance Product Specifications has been issued to use as a basis for waste acceptance criteria (EMAB-TWS-2011-05-C)
  - Majority of technical and programmatic recommendations are being evaluated as part of Secretarial Review of WTP (following slides)
- Headquarters response examples
  - Guidance and standard approaches for DOE O 413.3B (EMAB-TWS-2011-01-D)
  - Model developed by MITRE for SR tank farms (EMAB-TWS-2011-01-C2)

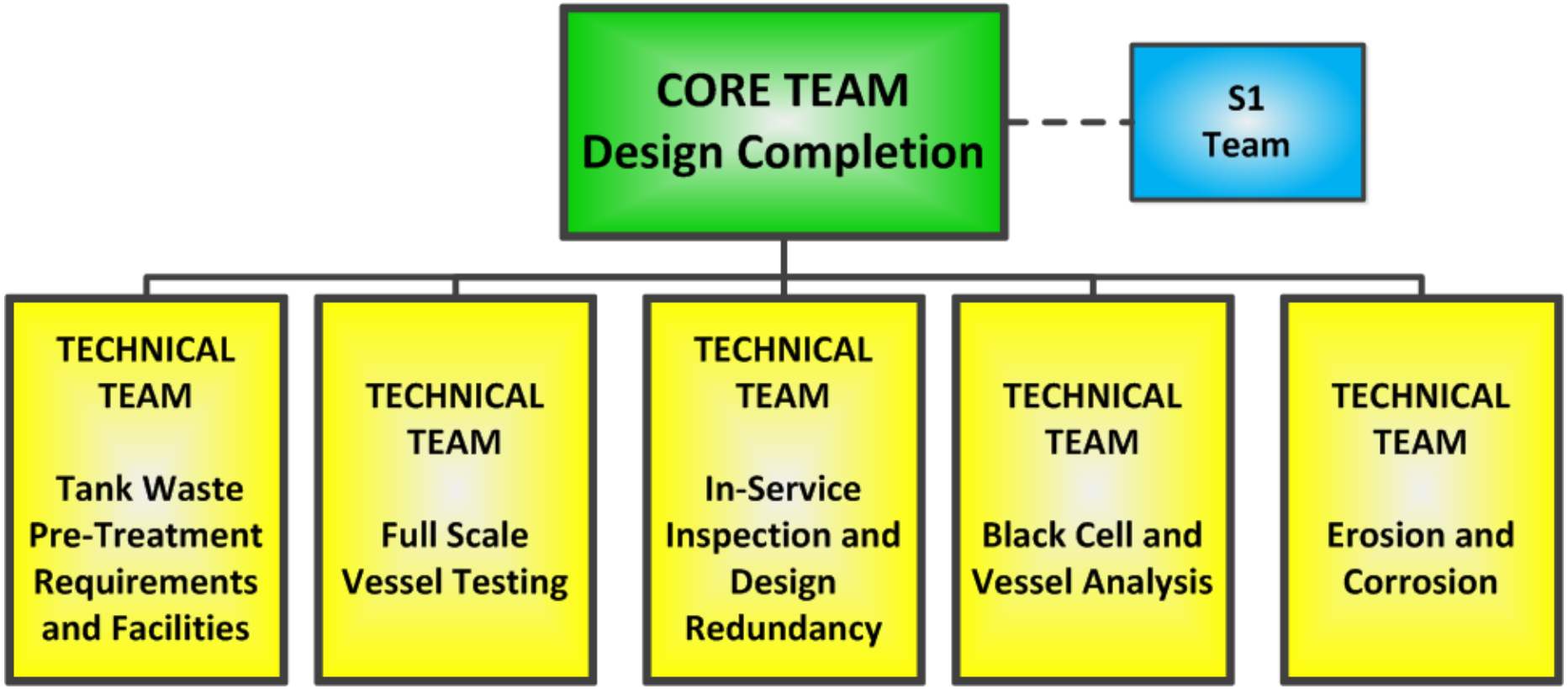
Recent Review Activity

- Almost exclusive focus on Hanford Tank Waste issues
  - 2012 DOE Inspector General (IG): The Department of Energy's $12.2 Billion Waste Treatment and Immobilization Plant – Quality Assurance Issues – Black Cell Vessels
  - 2012 DNFSB Report to Congress: Status of Significant Unresolved Issues with the Department of Energy's Design and Construction Projects
  - 2012 HSS Safety Culture Review: Independent Oversight Assessment of Nuclear Safety Culture and Management of Nuclear Safety Concerns at the Hanford Site Waste Treatment and Immobilization Plant (WTP)
  - 2012 DNFSB Erosion Issue: Review by DNFSB staff regarding wear (erosion and corrosion) allowances used for the design of piping, vessels, and pulse jet mixer (PJM) nozzles at the WTP
  - 2012 Differing Professional Opinion: "Differing Profession Opinion Panel Report - Unknown Viability of Black Cells and Piping at the Waste Treatment and Immobilization Plant at Hanford"
- Secretary of Energy Review provides major focus and emphasis

DOE Secretarial Review

- Design Completion Team was chartered to resolve the technical issues
  - Five topical areas identified (refer to next slide)
  - Subordinate technical teams formed
- Modeling (computational fluid dynamics) and scaling presented too many uncertainties to assess pulse jet mixing performance
  - Use full scale testing with actual vessels using relevant simulants
  - PNNL and SRNL tasked to develop the test plans, develop the simulants, and provide technical oversight of the testing
- Over-conservatism delaying completion of design (analysis paralysis)
  - Utilizing probabilistic (quantitative) risk assessments to inform design parameters and nuclear safety controls
- Diverse tank waste characteristics driving very broad WTP feed acceptance criteria
  - “Precondition” tank waste prior to delivery to WTP

WTP Design Completion Team



Conclusion

- A systematic approach has been developed to provide tracking of external reviews through the Tank Waste Corporate Board
- A focused effort has been initiated to resolve long-standing, complex technical issues that have stalled WTP design completion
- We are exploring alternative strategies and technical approaches for the tank waste disposition mission

Supplemental Information

Tank Waste FY 13 Budget

- EM Budget for FY-2013 = $ 5.29 B (after sequestration)
- Tank Waste Budget for FY- 2013 = $ 1.89 B
  - ORP: $1.09 B
  - SRS: $ 0.67 B
  - ID: $ 0.11 B
- Budget for Tank Wastes is approximately 36% of the total EM budget.
- Technology Development Budget
  - FY12 = $1.8M
  - FY13 = $3.2M
  - A robust tank waste technology development program requires funding of $20 to $30M per year if significant life-cycle cost reductions and schedule reductions are to be realized.