

Environmental Management Tank Waste Subcommittee (EM-TWS)
status report to
Environmental Management Advisory Board

FY 2011 Phase Two Work Plan Status

with focus on

Modeling for Life Cycle Cost Analysis (Interim Report)

February 24, 2011



Agenda

- Phase Two Work Plan
- Phase Two Schedule
- Review of Charges 1A/1B through 6
- Status of Charge 1A: *Liquid Tank Waste Processing Program: Modeling for Life Cycle Cost Analysis (Interim Report)*

EM-TWS Phase 2 Work Plan

Evaluate technological options that could have a positive impact on life cycle costs at the Hanford and Savannah River Sites

- Charge 1A: Modeling for Life Cycle Cost Analysis (LCCA)
- Charge 1B: Assessment of Life Cycle Cost Analyses of HLW strategies
- Charge 2: Assess candidate low-activity waste (LAW) forms
- Charge 3: Assess at-tank or in-tank candidate technologies for augmenting planned 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

Phase Two Schedule

- Two meetings already held
 - Savannah River Site (Augusta, GA) - December 2010
 - Hanford Site (Richland, WA) - January 2011
- Interim Report to EMAB with focus on LCCA - February 2011
- Interim meetings and teleconferences are scheduled over the course of data gathering and report drafting
- Targeting a report to EMAB at June 2011 meeting
- If required, a final report end of August 2011 (with possible EMAB telephonic meeting in September 2011)

Charges 1A, 1B – Life Cycle Cost

1A Modeling for Life Cycle Cost Analysis (LCCA)

- Interim Report follows

1B Assessment of Life Cycle Cost Analyses of HLW Strategies

- The DOE EM Assistant Secretary has requested an additional review of life cycle options as noted in the Work Plan for Phase 2, as amended.
- Recent addition of Plan 1B requires additional resources as well as added depth of analysis in reviewing options that could impact overall program life cycle costs and possible program savings.
- Charge 1B guidance has been provided through fact-finding meetings with the DOE CFO's office.

Final conclusions and recommendations will be included in the June 2011 report.

Charge 2: Assess candidate low-activity waste forms

Potential Issues and Vulnerabilities

- Inconsistent approach within DOE Programs and Sites in estimating costs that do not fully account for the total life cycle of a given project and its impact on out year funding requirements. Most relevant in the alternatives decision process.
- Some of the issues may be compensated for by focusing on the numbers of HLW and LAW canisters that would be produced; however, at Hanford, when treatment facilities are under construction and one critical treatment process has neither been selected nor designed, the situation may not be approximated well by focusing too closely on the numbers of waste forms produced.
- The phrase “as good as glass” may impact the clarity issue as it relates to waste form acceptance. A suggested concept might be the performance of a waste form that would be protective of human health and the environment for the regulated period of performance at the point(s) of compliance.

Charge 3: Assess at-tank or in-tank candidate technologies for augmenting planned waste pretreatment capabilities

Potential Issues and Vulnerabilities

Hanford

- Pre-conceptual cost data include preliminary engineering and design, capital cost, and annual operating cost estimates, but do not include LCC elements of D&D and waste disposition. This is a significant omission considering the long-term cost of HLW and LAW glass storage.
- Tank waste processing end-date will be impacted by the time required to build and reach full production capacity of the Supplemental Treatment Process. Schedule risk from use of new technologies (RMF and SCIX) may outweigh benefits.
- In-tank processing contamination control for maintenance of equipment

SRS

- Down-select process details need clarification. The SRS data call package is being supplemented to provide additional information.
- In-tank processing contamination control for maintenance of equipment

EM-TWS will continue to work on the issues in preparation for issuing a report in June 2011.

Charge 4: Evaluate various melter technologies

- The following melter technologies and approaches are being evaluated: advances in Joule-heated ceramic melters, cold crucible melting, induction heating, plasma torch continuous melter, in-can melter, rotary plasma arc melter, microwave heating, and bulk vitrification.

Potential Issues and Vulnerabilities

- Although technologies have been available for over 30 years, significant operating experience has only been accumulated for the slurry fed, Joule-heated ceramic melter and the two-step, calcine-fed, cold crucible induction heated melter.
- Since there is a good chance that all of the issues with the unproven technologies have not been worked out, the claimed advantages could disappear during implementation.
- While implementation of a new technology in a new facility could lead to some long-term savings, it may be questionable that backfitting a new technology into an already operating plant would be of significant benefit.

Charge 5: Evaluate the reliability of waste delivery plans

Potential Issues and Vulnerabilities

SRS

- The necessary increase in the production of qualified waste feed for future operations to accommodate increased HLW treatment throughput as well as possible off-gas treatment challenges
- SWPF processing has not been demonstrated with the existing infrastructure

Hanford

- Complex, interdependent, and highly constrained nature of the operations
- The Hanford 242-A evaporator currently represents a single point of failure for the production of wastes for treatment in the WTP.

Charge 6: Identify other tank waste vulnerabilities at SRS and Hanford

Potential Issues and Vulnerabilities

- Schedule risk: the 2020 Vision schedule is demanding and possibly at risk based on required gated process requirements and approvals
- Funding risk
- Regulatory compliance and compliance with the Tri-Party Agreement
- Workforce integration / jurisdiction for early operations
- Technology Readiness Levels
- Tank Farm readiness for accelerated treatment and operations

Charge 1A: Modeling for Life Cycle Cost Analysis

Background

- Tasked to review the modeling approaches for determining tank waste remediation LCCs at both SRS and Hanford.
- EM-TWS is evaluating assumptions in system plans for completing tank waste missions at Hanford and SRS, as well as the rigor and consistency of the models for identifying activities and costs through the end of each site's program.
- The DOE guidance for appropriation of capital-funded projects
 - OMB Capital Programming Guide, initially released in 1997 (the 2006 current version 2.0 issued to help clarify and provide examples for capital asset planning and management).
 - DOE O 413.3B provides additional guidance on IPTs for each project or program managed to ensure that each Federal Project Director has the support needed to effectively manage to its scope, cost, and schedule baseline.

Charge 1A: Modeling for Life Cycle Cost Analysis

Potential Issues and Vulnerabilities

- There is no distinction as to whether the capital project is a line item-funded (i.e., a standalone project with a (construction) project data sheet submitted as part of the Federal Agency's budget request to Congress) or operating budget-funded project.
- Technology development has uncertainty that is introduced to the LCC and appears to not be factored in the LCC in a manner that reflects operational contingency and backup planning.
- The estimates for the structures, components, and controls are one of a kind (in some cases, first of a kind) and seem to be more complicated than currently presented.
- It appears that the secondary treatment costs for operations are modeled in a simplistic methodology without operations backup.

Charge 1A: Modeling for Life Cycle Cost Analysis

Potential Issues and Vulnerabilities

- Most estimates are based on technology maturation plans that are success-oriented, where each test is expected to produce the desired result. This may be unrealistic in that the process of maturation requires an evaluation of assumptions and conditions that can lead to trying something else. Interdependence on other impacted systems is also a consideration.
- Some estimates are optimistic and only consider design and construction portions of the LCC. Operations, decommissioning, and disposition costs should be a considered factor when evaluating alternatives.
- The effect on LCC of facility processing rate can be significant, overwhelming all other parameters. Since the WTP pretreatment contains at least four new technologies; has large uncertainties in the waste feed characteristics; and involves solids processing, it appears that a chance may exist for extension of schedule.

Charge 1A: Modeling for Life Cycle Cost Analysis

Potential Issues and Vulnerabilities

- GAO recognized technology uncertainty and introduced the TRA (TRL) Program and the associated guidance for TRL 6 for CD-2, while DOE O 413.3B requires that a TRA be performed for CD-2.
- Complete decision-making process in weighing the alternatives, including process, engineering, procurement, construction, operation, maintenance, decommissioning, environmental risk, and disposition of waste
- In-Tank Process System Operation and Maintenance

Charge 1A: Modeling for Life Cycle Cost Analysis

Recommendations *Under Consideration*

- Develop a standardized, easy-to-understand, and consistent methodology for life cycle cost analysis that includes a operations-focused software tool to be used across the HLW Program Office for evaluation and decision making (corporate approach)
- Develop a consistent methodology for uncertainty characterization and management to facilitate analysis of error propagation and calculate overall system uncertainty; this should be translated to schedule and overall cost
- Finalize the planning for, and deployment of, a general planning model suited for uncertainty analysis, sensitivity analysis, and feasibility / optimization of retrieval, blending, and processing that would include the capability to propagate uncertainties through the planning process and characterize important uncertainties
- Work with DOE HQ and other program offices to adopt consensus standards for material properties across all models

Charge 1A: Modeling for Life Cycle Cost Analysis

Recommendations *Under Consideration*

- Continue to develop system-specific models with site-specific process characteristics that can be used to validate scenarios on tank waste system performance and to minimize life cycle costs
- Consider requiring the GAO 12-step cost estimating process to be applied to **ALL** projects greater than \$100M, both capital and operating-funded
- Recommend that SRS and Hanford use a standardized, tailored approach to document LCC in accordance with DOE O 413.3B for all HLW processing projects, regardless of budget funding level
- Both SRS and ORP need to rethink LCC beyond site boundaries and project operations to define the portion of the LCC that is D&D, validate the inclusion of D&D costs in the baseline, and update program documents accordingly for each of the HLW systems plans

Thank You