Environmental Management Tank Waste Subcommittee (EM-TWS)

Report to the

Environmental Management Advisory Board

FY 2011 EM-TWS Report- #003

June 23, 2011

Agenda

- Overview
  - Charges / Scope of Work
  - Committee Members and Support
  - Work Schedule
  - Plan Focus
- System Plan Basis of Review
- Phase II Report Findings and Observations
  - Charges 1 through 7
  - Status of Charge 8
- Vulnerabilities and Potential Mitigation
- EM-TWS Recommendations

Thanks to

DOE Headquarters

SRS Staff and Contractors

ORP Staff and Contractors

Regulators in South Carolina

Regulators in Washington

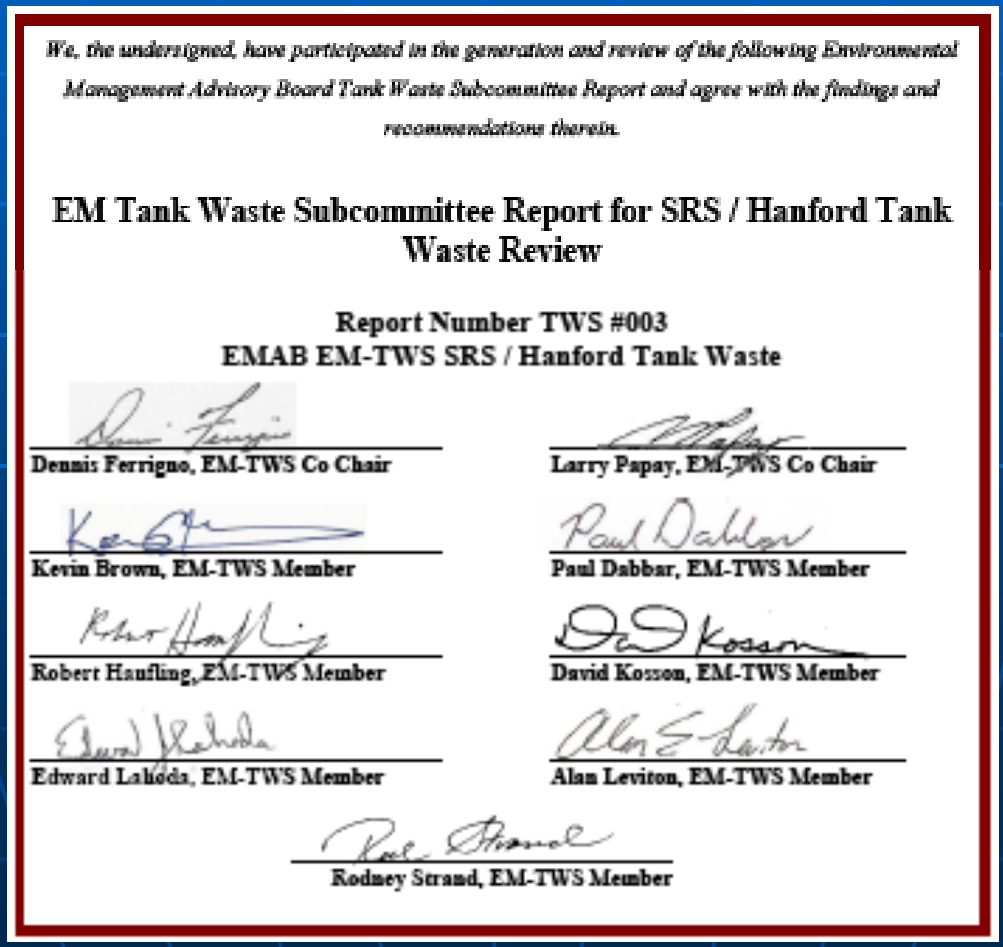
EMAB Staff Support

EM-TWS Phase II Work Plan

- ***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 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
- ***Charge 7:*** 2020 Vision, Early Start-up of One (1) LAW Melter
- ***Charge 8:*** Status Update - Alternate Retrieval Strategies for the Hanford Waste Tanks

The members of the Environmental Management Advisory Board Tank Waste Subcommittee agree with the findings and recommendations as attached for this report.

EM Tank Waste Subcommittee Report for SRS / Hanford Tank Waste Review
Report Number TWS-003



We, the undersigned, have participated in the generation and review of the following Environmental Management Advisory Board Tank Waste Subcommittee Report and agree with the findings and recommendations therein.

EM Tank Waste Subcommittee Report for SRS / Hanford Tank Waste Review

Report Number TWS #003
EMAB EM-TWS SRS / Hanford Tank Waste

Dennis Ferrigno, EM-TWS Co Chair

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System Plan Basis of Review

Mission Requirements for the 3 Major Scenarios – Hanford

Current Baseline	(1) 2020 Vision	(2) Supplemental Treatment Project	(3) Enhanced Tank Waste Strategy
Current Baseline mission requirements are reflected in System Plan 5	Earliest possible hot operations of completed WTP facilities LAW operating hot while PT and HLW are being commissioned Feed tank waste pretreated using filtration / ion exchange directly to LAW	Supplement WTP PT and LAW capacity over and above current design to match HLW capacity and meet mission requirements Additional LAW immobilization (selected from vitrification, FBSR, or grouting) Additional pretreatment options include in-/at- tank (using filtration / ion exchange)	Save seven years using transformational technologies Deployment of three FBSRs Deployment of in-tank pretreatment technologies (using filtration / ion exchange/ other technologies) Upgraded WTP HLW vitrification capacity, and enhanced tank farm delivery capacity

System Plan Basis of Review

Key Assumptions for the 3 Major Scenarios – Hanford			
Current Baseline	**(1) 2020 Vision**	**(2) Supplemental Treatment Project**	**(3) Enhanced Tank Waste Strategy**
Current Baseline assumptions are reflected in System Plan 5	Tank Farm pretreatment and LAW vitrification startup 12/16. Tank Farm PT runs until WTP PT startup 3/18 (nominally 15 months) Early opportunity to debottleneck LAW operations Opportunity to accelerate staffing, training and certification, and gain operational and management experience Accelerate commissioning	Tank Farm pretreatment startup and hot commissioning 1/18 Deployment of either an enhanced second LAW vitrification line or in-tank / at-tank pretreatment	Tank Farm pretreatment startup and hot commissioning 1/18 Assumes deployment of in-tank pre-treatment technology for full mission duration to supplement WTP PT capacity Assumes alternate LAW immobilization technology capacity will eliminate the requirement for WTP LAW facility Assumes enhanced tank farm delivery capacity is greater than current baseline

System Plan Basis of Review

Key Assumptions for the 3 Major Scenarios – Hanford (cont'd.)			
Current Baseline	**(1) 2020 Vision**	**(2) Supplemental Treatment Project**	**(3) Enhanced Tank Waste Strategy**
		Deployment of either an enhanced second LAW vitrification line or in-tank / at-tank pretreatment, alternatives plus alternative LAW immobilization technologies for full mission duration	Deployment of in-tank/at-tank pretreatment technology for full mission duration to supplement WTP PT capacity Alternate LAW immobilization technology capacity will eliminate the requirement for WTP LAW Enhanced tank farm delivery capacity is greater than current baseline

System Plan Basis of Review

Major Issues that Relate to 3 Major Scenarios – Hanford			
Current Baseline	**(1) 2020 Vision**	**(2) Supplemental Treatment Project**	**(3) Enhanced Tank Waste Strategy**
Baseline program mission is vulnerable to schedule and cost increases from potentially added construction and total project operations	Impact of WTP PT and HLW construction and commissioning in hot environment after LAW operations begin Delays in commissioning of LAW and or other WTP facilities could delay startup Potentially inadequate treatment of secondary waste from LAW vitrification facility	If FBSR is selected, it will be a first-of-a-kind, large facility application, assuming Idaho facility is operational Acceptance of a nonvitrified, alternate waste form by the cognizant regulatory authorities	Impact of WTP PT and HLW construction and commissioning in hot environment after LAW operations begin Acceptance of a nonvitrified, alternate waste form by the cognizant regulatory authorities. Regulatory "as good as glass" stakeholder and legal issues .

System Plan Basis of Review

Major Issues that Relate to 3 Major Scenarios – Hanford (cont'd.)			
Current Baseline	**(1) 2020 Vision**	**(2) Supplemental Treatment Project**	**(3) Enhanced Tank Waste Strategy**
Increases could be due to dilution of resources, complexity of additional engineering, added construction, and additional operational readiness requirements for added systems, risk mitigation measures, and inability to obtain increased funding over the near-term budget period	Delays in developing ETF upgrades could impact PT commissioning acceleration Delays in HLW and PT operations could increase LAW-only operation beyond 15 months, creating problems in managing secondary LAW	Regulatory "as good as glass" stakeholder and legal issues Potential for substantially higher operating, transportation, and disposal costs due to increased waste volume of nonvitrified product	Additional FBSR capacity would require rebalancing of integrated WTP operations Cost and schedule and technical maturation may eliminate currently perceived benefits of FBSR deployment Additional FBSR capacity would require revision to tank farm feed strategy Abandonment of time and capital investment in WTP LAW facility would be a program change that could discredit DOE as it relates to Congressional and stakeholder confidence in DOE decision making

System Plan Basis of Review

Mission Requirements for In-Tank Treatment (SCIX) and FBSR of Tank 48 – SRS		
Current Baseline	**(1) In-Tank Treatment SCIX**	**(2) Tank 48 FBSR Treatment**
Complete current baseline mission requirements are reflected in System Plan 16	Accelerate treatment as workaround to SWPF delays and to align salt waste processing schedule with DWPF sludge processing schedule Meet system plan commitment to remove tank waste by 2025 (three years early)	Treat and dispose of organic liquids from Tank 48 using FBSR

System Plan Basis of Review

Key Assumptions for SCIX and Tank 48 Treatment – SRS		
Current Baseline	**(1) In-Tank Treatment SCIX**	**(2) Tank 48 FBSR Treatment**
Complete current baseline assumptions are reflected in System Plan 16 SWPF operations delayed to July 2014 from May 2013 Deploy next-generation extractant to SWPF to increase processing rate to a nominal 7.2 Mgal/year from 6.0 Mgal/year	SCIX provides additional salt processing capability of 2.5 MGal/year beginning in October 2013 Accelerate liquid feed to SWPF / DWPF to recover three-year delay in schedule	Steam reforming completed and Tank 48 returned to service October 2016

System Plan Basis of Review

Major Issues for In-Tank Treatment (SCIX) and FBSR of Tank 48 – SRS		
Current Baseline	**(1) In-Tank Treatment SCIX**	**(2) Tank 48 FBSR Treatment**
Baseline program is vulnerable to increased construction schedule-based SWPF delays	Construction in a nuclear conduct of operations environment (Tank Farms)	Period of Rate of Return is a two-year campaign; the financial risk for funding is a major concern
	Technology development for RMF may add additional risk of deployment	DWPF operations improvements based on bubbler deployment and lessons learned have provided an alternate delivery potential that could eliminate the need for capital spending for FBSR In a net present value (NPV) analysis, the increased canister requirements may in fact be tolerated due to significant savings based on eliminating capital construction and startup of the FBSR

System Plan Basis of Review : Hanford 2020 Vision consideration as compared to current baseline sequential ORR BCP commissioning

	Construction Complete		Hot Commissioning	
	WTP Baseline	**Vision 2020**	**WTP Baseline**	**Vision 2020**
Laboratory	5/12	12/13	12/16	9/16
Low-Activity Waste Facility	3/14	10/14	12/16	9/16
Pretreatment Facility	2/16	2/16	6/18	12/17
High-Level Waste Facility	5/16	5/16	7/18	5/18
Interim Pretreatment System	N/A	12/15	N/A	9/16
End Interim Pretreatment Ops	N/A	N/A	N/A	removal decision in 3/20

System Plan Basis of Review : Hanford Supplemental Treatment consideration as compared to current baseline

	Construction Complete		Hot Commissioning	
	WTP Baseline	**Supplemental Treatment**	**WTP Baseline**	**Supplemental Treatment**
Laboratory	5/12	2/14	12/16	3/17
Low-Activity Waste Facility	3/14	5/15	12/16	3/17
Pretreatment Facility	2/16	3/16	6/18	3/19
High-Level Waste Facility	5/16	12/16	7/18	4/19
Supplemental Pretreatment System	N/A	N/A	N/A	1/18
Supplemental Treatment System	N/A	N/A	N/A	1/18

System Plan Basis of Review : Hanford Enhanced Treatment consideration as compared to current baseline

	Construction Complete		Hot Commissioning	
	WTP Baseline	**Enhanced Treatment**	**WTP Baseline**	**Enhanced Treatment**
Laboratory	5/12	3/14	12/16	3/19
Low-Activity Waste Facility	3/14	3/15	12/16	LAW does not operate
Pretreatment Facility	2/16	6/16	6/18	1/18
High-Level Waste Facility	5/16	12/16	7/18	4/19
Alternative LAW Treatment and Immobilization	N/A	1/17	N/A	1/18

System Plan Basis of Review - SRS- Summary of key baseline milestones and processing features from System Plan 16

Key Milestones		Processing Features	
Deploy next-generation extractant at MCU	Jan 2012	Total salt solution processed	96.0 Mgal
Initiate SCIX processing	Oct 2013	Salt solution processed via ARP/MCU	5.4 Mgal
Initiate SWPF processing	Jul 2014	Salt solution processed via SCIX	26.8 Mgal
Tank 48 Available	Oct 2016	Salt solution processed via SWPF	61.0 Mgal
Salt processing complete	2024	Total number of HLW canisters produced	7,557
SWPF facility removed from service	2025		
DWPF processing complete	2025		
DWPF facility removed from service	2026		

EM-TWS Report # 003 Recommendations

- 42 Recommendations
  - Overarching- 4 recommendations
  - Charge 1- LCC 7 recommendations
  - Charge 2- LAW Waste Form 4 recommendations
  - Charge 3- In Tank / At-Tank 9 recommendations
  - Charge 4- Melter Technology 3 recommendations
  - Charge 5- Waste Delivery 6 recommendations
  - Charge 6- Vulnerabilities 3 recommendations
  - Charge 7- Vision 2020 6 recommendations
- Listing provided separately for EMAB resolution and endorsement

Overarching Recommendations

- DOE should 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.
- DOE should seek to standardize life cycle cost evaluations system-wide when evaluating alternatives for technology and/ treatment system capital projects, regardless of expenditure level.
- DOE should proceed with a preliminary design funding request for execution of Vision 2020 to allow a single LAW melter to operate significantly earlier than in the baseline; on or about 2016.
- DOE-SRS and ORP should be extra vigilant in applying resources to additional project developments to the detriment of mission-critical system construction and operations (i.e., SWPF and WTP).

NIST Guide to Computing and Reporting LCC for EM Projects (NISTIR 6968, March 2003)

- Defining the project
- Setting the LCC parameters
- Organizing Environmental Cost Element Structure (ECES) data
- Computing the LCC of the project
- Comparing EM alternatives using LCC analysis

Charge 1 – Modeling for Life Cycle Cost Analysis

Findings, Observations, and Conclusions

- Strategy for uncertainty in alternative plans in the event of failure needs to be clearly identified
- Limited documentation of potential failure and alternate options as a “Plan B”
- Cost estimates tend to be optimistic; complexity is oversimplified
- Hanford EIS will have significant impact on LCC and mission success; could impact strategy

Charge 1 – Modeling for Life Cycle Cost Analysis

Findings, Observations, and Conclusions (cont'd.)

- Standardized Life Cycle Costs system (DOE EM system-wide) is needed
- Overall integrated model would be extremely helpful
- Positive impact of multi-year funding
- More rigor and disciplined documentation in selection of alternatives to decision making could ensure an overall lower LCC

Charge 1 – Modeling for Life Cycle Cost Analysis

Recommendations

- A standardized methodology should be used for analyses of LCC.
  - guidance using a tiered approach to define the accuracy and role of computer models in the review process
  - use a standardized approach for applying DOE O 413.3B at SRS and Hanford
  - the cost for waste disposition and environmental legacy in life -cycle cost alternatives analysis for CD-1 selection and documentation
  - documentation of performance and acceptance testing criteria for SWPF and WTP and review for potential risks and sensitivity analysis impacts to LCC
  - As such, the tank waste program focus should on such matters as operational efficiencies, operational costs, and schedule completion for SWPF and WTP and not be distracted by need for new technologies.

Charge 1 – Modeling for Life Cycle Cost Analysis

Recommendations (cont'd.)

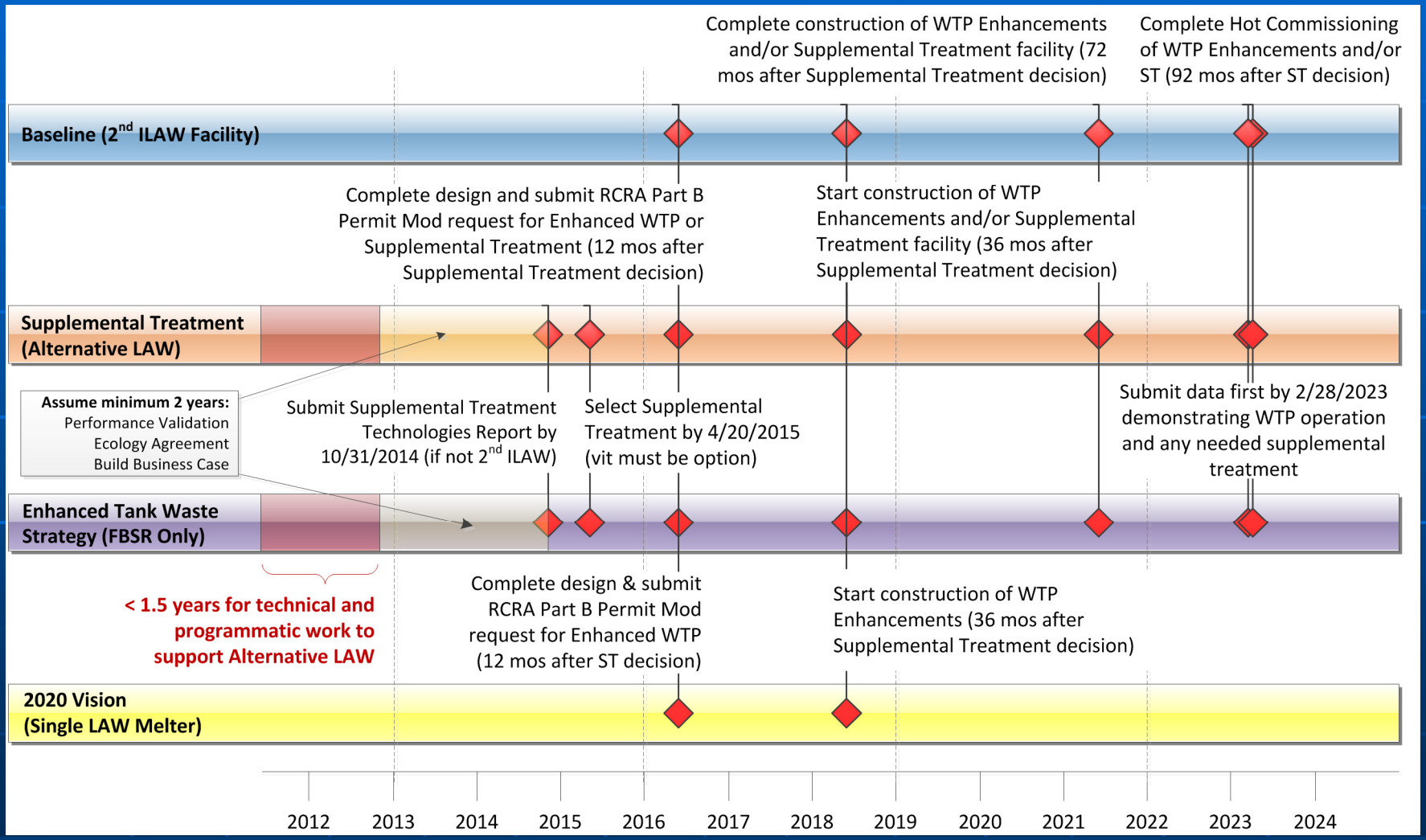
- The cost for waste disposition should be included in life cycle cost alternatives analysis for CD-1 selection and documentation. This is in addition to inclusion of capital, operating, decommissioning, and risk uncertainty analysis.
- Finally, DOE should investigate alternative paths for regulatory relief of milestones for SRS SWPF and WTP LAW processing and weigh the LCC options—based on possible partitioning of waste forms and their disposition—that could lead to expedited processing of the wastes and revisiting of the regulatory commitments.

Charge 2: Assess candidate low-activity waste forms

Findings, Observations, and Conclusions

- There may be insufficient time to develop an acceptable alternative LAW treatment process and waste form
  - EM-TEG indicated alternative treatment technologies and waste forms not developed adequately for a conclusive evaluation of performance or cost-benefit analysis
- There appears to be inadequate flexibility in waste treatment processes and strategies
  - Global approaches appear to have impacted choices of treatment technologies and waste forms
- Vitrification appears to be seen by Ecology as the only acceptable technology for Hanford LAW treatment

Waste Form Critical Path Decision Process



Charge 2: Assess candidate low-activity waste forms

Findings , Observations, and Conclusions (cont'd.)

- Modeling that captures relevant controlling processes and conditions must be used to determine the relative performance of an alternative LAW form to that of glass
  - This requires the careful management of uncertainties
- The difficulty in capturing volatile contaminants of concern (e.g., Tc-99) in LAW glass should be taken into account when considering alternative treatment processes and waste forms for Hanford LAW
  - Off-site disposal, other technologies to immobilize volatile / mobile contaminants, and techniques to better incorporate these contaminants in LAW glass

Charge 2: Assess candidate low-activity waste forms

Recommendations

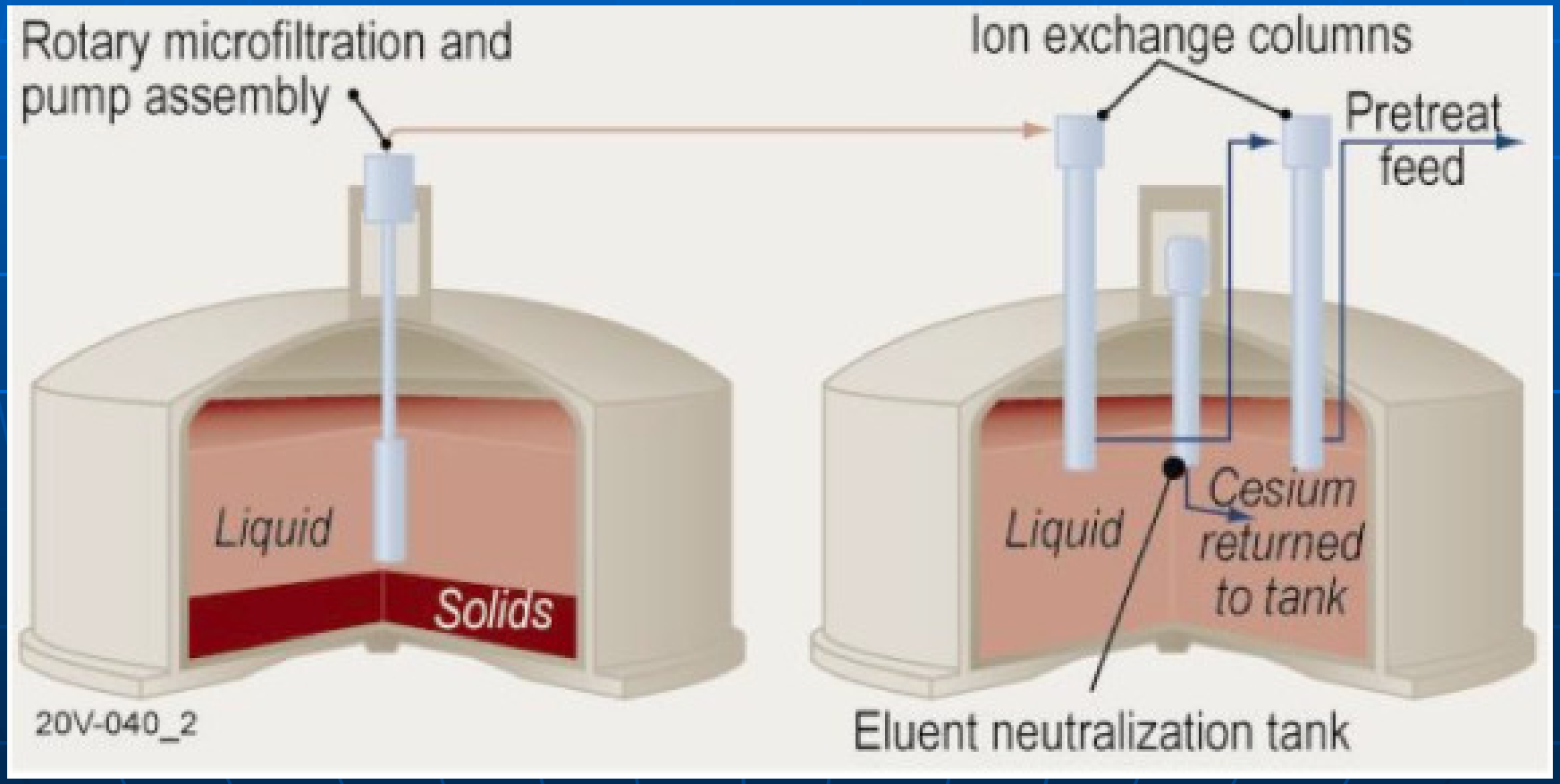
- Prior to any downselection for Supplemental LAW treatment, DOE, in conjunction with its regulators, should develop an approach to development and implementation of a treatment process, waste form, and disposition pathway that explicitly addresses the challenging fractions of LAW that limit near-surface disposal options and provides a viable option to a second LAW vitrification facility. This will likely necessitate consideration of a separation of Tc-99, and possibly other constituents, that drive near-surface disposal risk to the extent that Tc-99 may not be incorporated into vitrified LAW using the WTP LAW vitrification facility.

Charge 2: Assess candidate low-activity waste forms

Recommendations (cont'd.)

- DOE should include a targeted processing and treatment approach (that may include segregation and alternative treatment) based on an evaluation of waste characteristics including uncertainties in the system planning process.
- ORP needs to work with the Washington State Department of Ecology to develop strategies, infrastructure, models, and processes to provide adequate flexibility in waste treatment processing.
- Further, ORP needs to work with the Washington State Department of Ecology to evaluate the potential application of alternative treatment technologies and resulting waste forms.

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



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

Findings, Observations, and Conclusions

In terms of SRS:

- SCIX is a developmental process
- CST history and SRS process technology make CST the preferred ion exchange medium for SRS
- CST has potential to form agglomerates in salt waste service
- Potential exists to generate high temperature and pressure in SCIX CST ion exchange column

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

Findings, Observations, and Conclusions (cont'd.)

For Hanford:

- In general, sRF ion exchange resin is a better choice than CST for in-tank pretreatment cesium removal step
  - Use of disposable CST canisters in the 2020 Vision scenario is an exception
- Crossflow filtration is a mature technology, well suited for treating Hanford salt waste
- RMF is a promising technology that needs to be demonstrated on actual wastes in SRS tank farm

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

Recommendations

At SRS:

- Document the SCIX alternatives downselect process, including financial analysis, in support of the decision to select in-tank treatment over other options.
- Steps need to be taken to mitigate the risk of CST agglomeration.
- Conduct a detailed safety basis and HAZOP review to document passive safety design for the SCIX process.
- Do full-scale testing to ensure that a homogeneous bed of IONSIV® IE-911-CW can be established and operated without channeling which could adversely affect Cs-137 removal.
- Have an external panel review the 1.3-million-gallon tank mixing design to ensure the design will meet MST strike performance objectives. External expert review of MST strike scale-up

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

Recommendations (cont'd.)

At Hanford:

- Spherical resorcinol formaldehyde (sRF) ion exchange resin meets the technical requirements for cesium removal in the short-duration Vision 2020 scenario. However, other potentially simpler options for Vision 2020 could also be evaluated.
- Crossflow filtration (CFF) be used for processing Hanford AP tank farm supernate. Also, an in-tank CFF option should be evaluated for the Vision 2020 scenario.
- A comprehensive experimental program be conducted at Hanford, with actual samples, prior to Vision 2020 CD-2 submission.
- Additional RMF testing be conducted as mechanical reliability and maintainability need to be demonstrated based on actual operation of the SRS Tank 41 SCIX process before deploying RMF technology.

Charge 4: Evaluate various melter technologies

Findings, Observations, and Conclusions

- Joule-heated technology is the preferred technology
  - Joule-heated melter technology without bubblers has been proven a reliable process in both the SRS and West Valley operations
- Alternative technologies to Joule-heated melters are in various (lower) stages of maturity
  - Cold crucible induction melting (CCIM) most advanced alternative
  - CCIM has greatest potential for producing significant improvements in terms of increased temperature and alternate glass performance

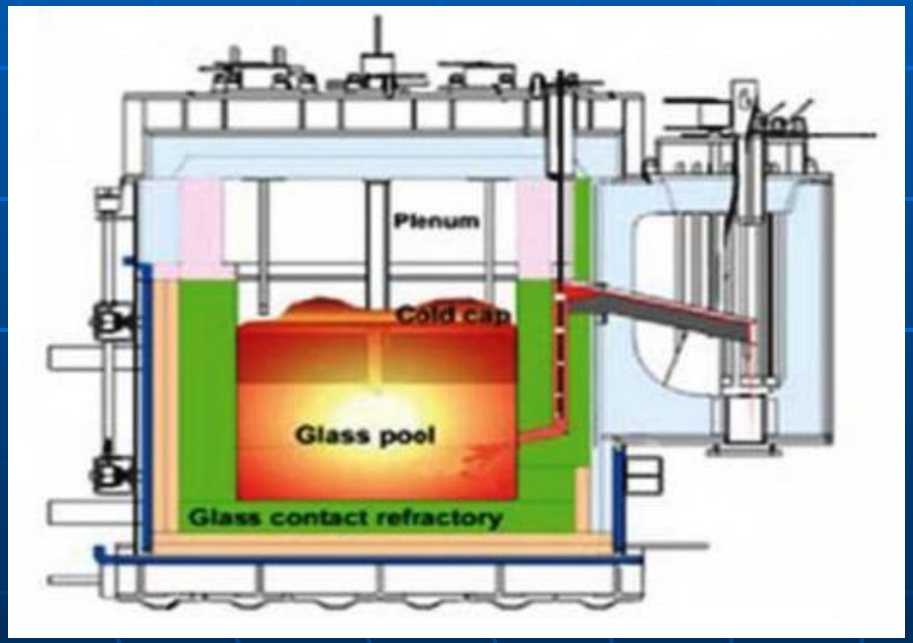
Charge 4: Evaluate various melter technologies

Findings, Observations, and Conclusions (cont'd.)

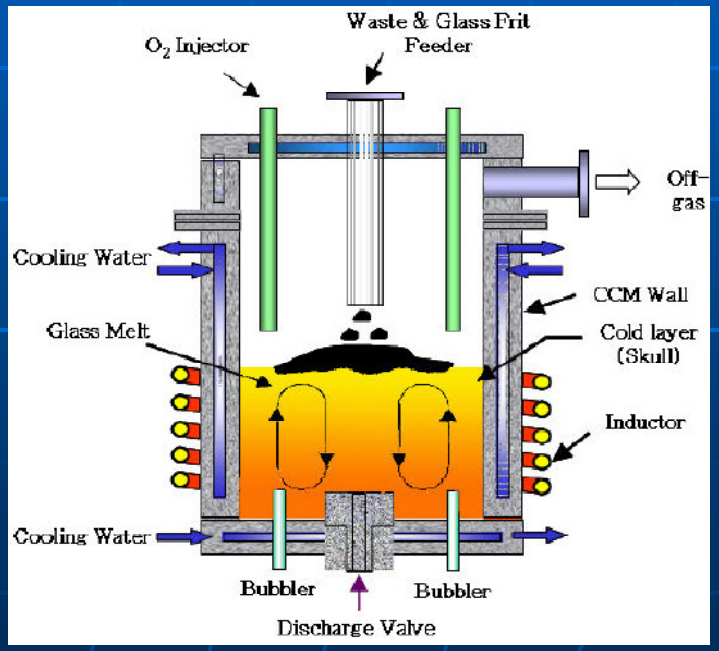
- Optimum approach is to improve current Joule-heated technology
- Backfitting new melter technology calls for certain operational considerations
  - Implementing a new technology in an already operating hot facility is very risky
  - New high-throughput melter technologies likely to be limited by other bottlenecks
  - New technologies not likely to achieve significant cost savings – small part of overall capital costs

Pictures of Joule and Cold Crucible Melters

U.S. Version of Joule-Heated Ceramic Melter with Side Pour



Section View of the Nuclear Engineering and Technology Institute (NETEC) CCIM



Charge 4: Evaluate various melter technologies

Recommendations

- Near-term technological development focus should be on Joule-heated, ceramic-lined melters and improvements thereto.
- A chemistry-based systems model should be developed that would allow optimum scheduling of the tanks to be processed.
- If an alternative melter technology is needed, detailed development utilizing CCIM technology should be undertaken.

Charge 5: Evaluate the reliability of waste delivery plans

Findings, Observations, and Conclusions

- There is a critical need to balance retrieval, pretreatment, and qualification and treatment of resulting LAW and HLW at both Sites.
  - At SRS, a balance has been struck between production of qualified feed batches and treatment. Improvements require a future increase in the production of feed for treatment and striking a new balance between feed preparation and treatment.
  - At Hanford, a similar balance must be established and maintained. Delivery is more complicated than at SRS. The second LAW treatment facility can be sized to help strike such a balance.
- To satisfy current schedules / milestones and to balance LAW and HLW feed delivery and treatment, there will be a need to increase the production of qualified feeds at both SRS and Hanford.
  - This requires *significant* increases in retrieval, pretreatment, and qualification of tank wastes at both sites.

Charge 5: Evaluate the reliability of waste delivery plans

Findings, Observations, and Conclusions (cont'd.)

- The feeds and tank farm operations (especially SST) at Hanford are complex, interdependent, and highly constrained, which may impact waste feed delivery and thus treatment.
  - At SRS, only PUREX (including HM) was used
  - At Hanford, PUREX, bismuth phosphate, and REDOX were used. There are more waste tanks containing more waste types in more variable wastes than at SRS.
  - There are significant regulatory constraints on SST processing.
- Upgrades needed for the Hanford ETF to treat liquid wastes generated from the WTP.
  - Treating WTP wastewater will require upgrades at ETF to manage increased throughput and corrosion potential from WTP effluents.
  - There may be potential issues related to Tc-99 and other contaminants that may exceed ETF limits

Charge 5: Evaluate the reliability of waste delivery plans

Findings, Observations, and Conclusions (cont'd.)

- The WAC for the Hanford tank waste treatment and disposal facilities have not been finalized, which may impact feed delivery.
  - Because key aspects of feed delivery interface (ICD-19) are not final, limits and targets for Hanford waste feed delivery are uncertain.
- Representative mixing and sampling in Hanford tanks needed to support waste feed delivery for WTP treatment will be problematic.
  - If methods cannot be identified or developed to satisfy limits, additional sampling and analysis may be required.
- Temporary storage options may be needed for treated Hanford TRU, LAW, and HLW to manage waste feed delivery and treatment schedules and to satisfy milestones.
  - Lack of storage due to funding, building, or permitting difficulties may impact treatment and tank farm operations

Charge 5: Evaluate the reliability of waste delivery plans

Findings, Observations, and Conclusions (cont'd.)

- The Hanford 242-A Evaporator represents a single-point of failure that may significantly impact waste feed delivery.
  - Additional capacity being researched; however, these technologies would not replace 242-A Evaporator functionality.
  - Plans require much higher annual availability beginning in 2030, when the Evaporator will be over 50 years old, through 2040
- Fouling may still be an issue in the SRS 2H Evaporator System
  - Fouling still occurs, but cleaning methods have improved
- Factors have changes that may make FBSR not the most appropriate technology to destroy organics in the SRS Tank 48H waste.
  - Since FBSR was selected to treat this waste, factors have resulted in a review of the costs, schedule, and technical maturity criteria.
  - Led to evaluating direct vitrification and a copper catalyzed process not previously considered

Charge 5: Evaluate the reliability of waste delivery plans

Findings, Observations, and Conclusions (cont'd.)

- A large number of projects (approximately 30) must be completed to pretreat and feed low-activity waste to the ILAW facility
  - There is a reasonable chance that each can be completed independently as long as budget requests are met.
  - Potential funding difficulties and/or accelerating treatment may significantly decrease chance of completing all necessary projects in time.

Charge 5: Evaluate the reliability of waste delivery plans

Recommendations

- DOE, in conjunction with its regulators, should establish consensus on strategies, infrastructure, models, and processes to provide adequate flexibility in waste feed preparation and treatment.
- DOE should formally evaluate the single-point failure impact of the Hanford 242-A evaporator. DOE should address the need for additional capacity to supplement the 242-A evaporator in case of failure.
- The waste acceptance criteria (WAC) for the Hanford tank waste treatment facilities and disposal facilities should be finalized as soon as possible to reduce the potential impact on waste feed delivery and treatment schedules and milestones.

Charge 5: Evaluate the reliability of waste delivery plans

Recommendations (cont'd.)

- DOE should develop a mitigation strategy for the potential inability to adequately and efficiently mix, sample, and deliver wastes to the WTP.
- In the system planning process, DOE evaluate the various options for processing the SRS Tank 48H waste.
- DOE should implement previous recommendations that potentially impact alternative treatment technologies and forms for Hanford LAW (crosscutting).

Charge 7: 2020 Vision, Early Start-up of One (1) LAW Melter

Findings, Observations, and Conclusions

- The Vision 2020 increases the likelihood that DOE will successfully comply with the key 2010 Consent Decree milestones for "Hot Start of Waste Treatment Plant" by 12/31/2019 and "Initial Plant Operations" (IPO) by 12/31/2022.
  - A clear, coherent and integrated financial business case for Vision 2020 has not been provided.
- The proposed plan will not significantly reduce the timeframe for completion of waste treatment at Hanford nor reduce lifecycle costs. The primary benefits of proposed plan, if successful, are:
  - Achieving treatment of LAW and production of vitrified LAW 15 months earlier than the baseline plan
  - Reducing the risk of delays to full WTP commissioning and hot operations

Charge 7: 2020 Vision, Early Start-up of One (1) LAW Melter

Findings, Observations, and Conclusions (cont'd.)

The primary benefits from the Vision 2020 – One System

- Management integration between WTP and TOC to achieve WTP startup
- Sequential commissioning of LAB/LAW, HLW, and PT facilities to provide a more achievable schedule and sequence for ramp-up and to demonstrate operability
- Initial production of LAW glass up to fifteen months earlier than the current baseline plan
- The potential to de-link initial LAW and HLW facilities operations from PT commissioning, which will likely present the most serious commissioning schedule challenges

Charge 7: 2020 Vision, Early Start-up of One (1) LAW Melter

Recommendations

- The management realignment and integration between the Tank Farms and WTP proposed in the "Vision 2020 – One System Plan" should be supported and encouraged.
- The benefits and risks from the Vision 2020 - One System proposal need to be better articulated and quantified where possible to form a compelling business case for implementation. Probabilistic simulation of the cost and schedule uncertainties associated with the Vision 2020 – One System Plan should be part of the detailed Vision 2020 – One System proposal and summarized in the business case to provide improved clarity regarding the cost and schedule risks and confidence.
- The technical path of sequential commissioning of WTP BOF, LAW, and Laboratory, followed by commissioning of PT and HLW, should be supported.

Charge 7: 2020 Vision, Early Start-up of One (1) LAW Melter

Recommendations (cont'd.)

- The technical plan under Vision 2020 should focus solely on what is needed and essential to achieve LAW hot operations as soon as technically and programmatically feasible, along with WTP full commissioning by 2018 and IPO by 2022.
  - Vision 2020 should not be the platform for technology maturation and system development to support Supplemental LAW treatment or other needs unless clearly justified by the business case.
- The highest priority for ORP and WTP should be to achieve the earliest practical initial processing at WTP of LAW and HLW, including PT.
- DOE, TOC, and WTP contractors should make it a high priority to develop an integrated, fast-track permitting approach in active collaboration with regulators.

Charge 8: Status Update – Alternate Retrieval Strategies for the Hanford Waste Tanks

Status Update

- EM-TWS Charge 8 Review Team has started due diligence
- Review is scheduled for completion August ’11
- Draft Report to be issued in September EMAB Meeting

Charge 6: Tank waste vulnerabilities at Hanford – Vision 2020

Vulnerability

- Very aggressive schedule

Mitigation

- Focus on deliverables and the schedule
- Quarterly Risk Register review
- Start partnering with Ecology immediately
- Establish single-line accountability with Ecology to execute permit agreements

Charge 6: Tank waste vulnerabilities at Hanford – Vision 2020

Vulnerability	Mitigation
▪ DOE LCC System-wide process and process application are lacking consistency for cost estimating (Hanford & SRS all programs)	▪ Use a system-wide process for cost and schedule (BLCC5) ▪ Provide documented NPV calculations when selecting alternatives and report baseline LCC cost savings and monetized risks in current year funded dollars.

Charge 6: Tank waste vulnerabilities at Hanford – Vision 2020

Vulnerability	Mitigation
Long-term workforce jurisdiction determination will be driven by short-term 2020 requirements	Start workforce jurisdiction analysis now
Unanticipated difficulties in construction in an operating nuclear area	Establish clear owner/operator control for capital construction of nuclear facilities

Charge 6: Tank waste vulnerabilities at Hanford – Vision 2020

Vulnerability

- Large number of modification projects needed to support needed transfers
- Regulatory permits on critical path

Mitigation

- Order and base-fund needed modifications to support accelerated operations without compromising WTP
- Partner with regulators now and set accelerated permit process

Charge 6: Tank waste vulnerabilities at Hanford – Supplemental Treatment

Vulnerability	Mitigation
▪ Difficulty retrieving sludge from Hanford DSTs when using CST ion exchange	▪ Use disposable high-integrity containers configured as ion exchange canisters
▪ CST IX column overheating	▪ HAZOP or equivalent work process
▪ FBSR mineralized waste form	▪ Mineral waste form, benchmarks, and testing requirements performance-based instead of technology-based.

Charge 6: Tank waste vulnerabilities at Hanford – Supplemental Treatment

Vulnerability

- Grouting / Cast stone
- Alternate Melter Technology
- Retention of Tc-99 in LAW glass
- 242-A Evaporator is a single point of failure

Mitigation

- Identify treatment technologies
- Test to TRL 7
- Gas/liquid equilibrium of Tc; verify in testing
- WFE to offset some of the load and risk, but do not replace 242-A functionality

Charge 6: Tank waste vulnerabilities at Hanford – Enhanced Treatment

Vulnerability

- Same vulnerabilities as Supplemental Treatment
- Waste compliance feed requirements for feed to WTP

Mitigation

- Develop credible feed requirements; separate wastes by treatment difficulty and process

Charge 6: Tank waste vulnerabilities at SRS RMF / SCIX / Treatment

Vulnerability	Mitigation
LCC methodology is not defensible	Develop detailed CD-2 cost and schedule estimates and baseline with appropriate programmatic approval
LCC system-wide processes are lacking for cost estimating	Use a system-wide process for cost and schedule estimating such as BLCC5

Charge 6: Tank waste vulnerabilities at SRS RMF / SCIX / Treatment

Vulnerability	Mitigation
▪ Selection of technology alternatives may not be ideal based on failure to use NPV calculation	▪ Utilize NPV technology evaluation and document design / operating parametric
▪ Budget restrictions greater than one year	▪ Renegotiate regulatory commitments, provide technical workarounds

Charge 6: Tank waste vulnerabilities at SRS Tank 48 Treatment Strategy

Vulnerability

- LCC vulnerabilities similar to other SRS noted vulnerabilities
- FBSR planned to be designed, built, operated, and mission completed by 2016

Mitigation

- Evaluate alternate approach using DWPF or chemical oxidation

Charge 6: Tank waste vulnerabilities at SRS Tank 48 Treatment Strategy

Vulnerability

- FBSR potentially not appropriate treatment technology

Mitigation

- Explore the potential campaigns that are direct feed to DWPF:

1) Establish a safety basis that allows a small bleed to the DWPF concurrently while the current campaigns for sludge is processed

Or

2) Establish a separate campaign later in System Plan and not use Tank 48 as a salt batch feed tank. Use a different tank as substitute for tank 48 as feed to Salt waste

Evaluate potential use of chemical oxidation; continue to use Tank 21 for salt batch blending.

Thank You

Background Materials