Midyear Review Report
FY 2002

May 2002

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Executive Summary

The Tanks Focus Area (TFA) conducted its Fiscal Year (FY) 2002 Midyear Review March 11-14, 2002, in Salt Lake City, Utah. The Midyear Review, coordinated by the TFA Technical Team, is conducted annually to validate and document TFA's technical strategy and plans, the maturity and progress of the projects in its portfolio, and to ensure user readiness and commitment. Also during this time, TFA's users prioritize their science and technology (S&T) development needs for the coming year.

In keeping with new direction from the US Department of Energy's (DOE's) Office of Environmental Management (EM), this year's review focused on assessing TFA projects in light of their relevance to and impact on EM's new thrust areas for S&T - pursuit of alternative approaches to current high risk/cost areas in site cleanup baselines, and support to the closure sites (Fernald and Rocky Flats). In all, 72 TFA projects were reviewed, with two projects undergoing a more in-depth technical review. Principal Investigators provided project update presentations on 41 projects, while TFA's Technology Integration Managers presented brief updates on projects scheduled for closure in FY 2002 or those projects that had recently been initiated. Reviewers included DOE-Headquarters and TFA Program Management staff, and TFA's Site Representatives, User Steering Group (USG) members, and the Technical Advisory Group. TFA's Site Representatives also provided an update on their site's tank waste programs, focusing on high risk/cost areas where future S&T investments would have the most impact.

During an Executive Session on March 14, 2002, the TFA Management Team and USG discussed the compiled, consensus results of the reviews based on individual reviewer scoring for each project presentation. These results helped determine which projects would be advocated by the sites to transition into the new thrust areas and new project opportunities for high-level waste in FY 2003.

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Acronyms

ADMP	Advanced Design Mixer Pump
AEAT	AEA Technology
ASTD	Accelerated Site Technology Deployment
CHG	CH2M Hill Hanford Group
DNPMP	Dual-Nozzle Pulsating Mixer Pump
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy Headquarters
DWPF	Defense Waste Processing Facility
EM	Office of Environmental Management (DOE)
EMSP	Environmental Management Science Program
FY	fiscal year
GAAT	Gunite and Associated Tanks
HLW	high-level waste
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LAW	low-activity waste
MRS	Mobile Retrieval System
NPOx	nitric acid, potassium permanganate, oxalic acid
ORP	Office of River Protection (DOE)
ORR	Oak Ridge Reservation
OST	Office of Science and Technology (EM)
PI	Principal Investigator
PNNL	Pacific Northwest National Laboratory
RBX	Robotics Crosscutting Program
RCRA	Resource Conservation and Recovery Act
R&D	research and development
S&T	science and technology
SFMRF	slurry fed melt rate furnace

SPP	Salt Processing Project
SRS	Savannah River Site
TFA	Tanks Focus Area
TIM	Technology Integration Manager
USG	User Steering Group
WTP	Waste Treatment Plant
WVDP	West Valley Demonstration Project

1.0 Introduction

In 2002, the US Department of Energy (DOE) Office of Environmental Management (EM) directed to the Office of Science and Technology (OST) to focus its science and technology (S&T) program on two new S&T thrusts - pursuit of alternative approaches to current high risk/cost areas in site cleanup baselines and support to the closure sites (Fernald and Rocky Flats). In response to this direction, the Tanks Focus Area's (TFA's) Fiscal Year (FY) 2002 Midyear Review was reformatted to support these two new thrusts.

1.1 Purpose of the Midyear Review

The overall objective of TFA's FY 2002 Midyear Review was to review TFA projects for their impact on reducing high risk/cost areas of site baselines. In support of this objective, the review included two major activities - (1) a Midyear Review Meeting to review TFA projects for their relevance to and technical impact on reducing high risk/cost areas of site cleanup baselines, and (2) a Management Team Executive Session to generate recommendations regarding the path forward for each project, to support subsequent decisions in transitioning to the two new OST S&T thrusts. All TFA projects were evaluated in the broad context of potential high-level, waste (HLW) alternatives opportunities and closure site support for EM consideration.

1.2 Midyear Review Meeting

The Midyear Review Meeting portion of TFA's Midyear Review was held March 11-13, 2002. The agenda for the Midyear Review Meeting is contained in Appendix A. The Meeting was organized into the following sessions:

- a program overview session, and
- a project review session.

The program overview session contained presentations by (1) OST Management on the plans to implement the new S&T thrusts and (2) Site representatives on the status of their HLW program and the potential opportunities for reduction of high risk/high cost areas of their site's baselines.

The review session entailed project presentations by TFA's Principal Investigators (PIs) or Technology Integration Managers (TIMs) to a Review Team composed of the TFA Management Team, Site Representatives, the User Steering Group (USG), and the Technical Advisory Group (see Appendix B). The review session was organized into smaller sessions around the potential HLW alternative opportunities. PIs provided project status presentations on selected TFA projects that included a summary of the project scope, an assessment of the current level of development of the technical solution, accomplishments, activities planned to ensure successful delivery of the technical solution, and the high risk/cost reduction impact of the work. In addition, the PIs for the two projects undergoing

in-depth technical reviews expanded their presentations to include more detailed information on the technical work being performed under the project. TIM presentations provided brief updates on remaining projects - projects scheduled for closure in FY 2002 or projects that had recently been initiated. Presentations included a summary description of the project, technical status and results, and the project's impact on the high risk/cost reduction opportunities in the site baselines.

The project presentations were followed by executive sessions of the Review Team in which the projects were discussed and consensus review results documented. To assist the Review Team in preparing for the reviews, background materials consisting of the potential high risk/cost reduction opportunities at the sites, fact sheets providing a summary-level description for each project, and PI presentation guidance and template were provided in advance of the Midyear Review Meeting.

1.3 Management Team Executive Session

Following the Midyear Review Meeting, TFA's Management Team and the USG met in an Executive Session on March 14, 2002, to review and discuss the compiled review results reflecting the consensus of the Review Team. Representatives of the Review Team provided additional information, as requested. Site feedback regarding the results for their projects was also provided. Based on the Review Team's consensus results and input from the sites, the TFA Management Team and USG formulated recommendations regarding the path forward for the projects - transition into the new EM thrust areas for HLW in FY 2003, or phase out in FY 2002. The recommendations formulated during this meeting were subsequently presented to the OST Transition Committee on March 26-27, 2002.

2.0 Overview of the Program

The TFA is responsible for managing, coordinating, and leveraging S&T development to support the HLW program needs of DOE's five major tank sites: Hanford Site (Washington), Idaho National Engineering and Environmental Laboratory (INEEL) (Idaho), Oak Ridge Reservation (ORR) (Tennessee), Savannah River Site (SRS) (South Carolina), and West Valley Demonstration Project (WVDP) (New York). The TFA also supports the Fernald Environmental Management Project (Fernald) (Ohio), by providing technical assistance as requested.

The TFA's technical scope covers the major functions that comprise a complete tank remediation system: waste storage, waste retrieval, waste pretreatment, waste immobilization, and tank closure/waste disposal, with safety, characterization, and monitoring (of both the waste and tank) integrated into all the functions. The TFA helps integrate program activities across a number of organizations that fund HLW tank S&T development, including the DOE Offices of Site Closure, Project Completion, and Science and Technology.

2.1 TFA Program Mission and Goals

The TFA mission is to work with users to develop, deliver, and implement technical solutions – through an integrated approach - to safely and efficiently accomplish tank waste remediation at five major DOE sites: Hanford Site, INEEL, ORR, SRS, and WVDP. Inherent to this mission, the TFA seeks to:

- Provide technical solutions to enable and enhance remediation.
- Respond to the unique technical challenges posed by the complexity of HLW tank remediation.
- Work with users and program partners through the entire process, from problem identification to implementation of technical solutions.
- Focus on filling technical gaps and making tangible progress toward solving key tank problems.

More detailed goals and strategies can be found in TFA's FY 2002-2006 Multiyear Program Plan (MYPP) available on the TFA website at http://www.pnl.gov/tfa/documents.stm.

2.2 FY 2002 Program Progress

Significant events and achievements thus far in FY 2002 are summarized below:

- TFA participated in a project review in October 2001 at Fernald, to provide optimization recommendations relating to the sluicing and treatment of radioactive waste from two silos. TFA also contributed input to the test loop layout, test plan development, and test simulant selection for two candidate commercial mining centrifugal pumps selected for evaluation by Fernald for silo retrieval activities.

- TFA and CH2M Hill Hanford Group (CHG) held a working meeting in October 2001 to discuss specific technical issues impacting saltwell-pumping activities under CHG's Interim Stabilization Project. TFA coordinated a five-member expert panel consisting of private industry consultants, university and Argonne National Laboratory representatives, to participate in the review.

- TFA and INEEL site personnel installed the Small Tank Fluidic Sampling and Retrieval System on Tank 4 of the Test Reactor at INEEL in October 2001.

- In October 2001, TFA and INEEL deployed the Vault Sump Sampler in the Tank WM-182 vault at INEEL, to inspect and obtain material samples in the vault sump.

- TFA and INEEL personnel resumed deployment of the sprayball and steamjet eductor in Tank WM-182 in October 2001, to dislodge and remove material from the tank walls, piping and cooling coils.

- TFA and the Environmental Management and Science Program (EMSP) held a kickoff meeting in November 2001 to discuss 32 new EMSP HLW project awards (three-year duration) and their potential impact on tank remediation problems across the DOE sites. These new awards are focused on longer-term research needs associated with Hanford, SRS, and INEEL -- sites that have long-term tank waste remediation missions.

- In December 2001, TFA, CHG, and Robotics Crosscutting Program (RBX) personnel successfully deployed the Pit Viper in the heel pit of Hanford Tank C-104, demonstrating the system's ability to perform remote cleaning and repair tasks.

- In March 2002, TFA and RBX conducted an independent review of the planned cold testing for Mobile Retrieval System (MRS) for installation in Tank C-104 at Hanford. Briefings were provided on project status, the MRS system concept, risk analysis and mitigation, planned factory acceptance tests, and future functional and operational cold testing. The review panel also discussed lessons learned from the Oak Ridge National Laboratory tank remediation and system test experiences.

- TFA, the Office of River Protection (ORP), and CHG co-sponsored a technology workshop in April 2002 in support of the Mission Acceleration Initiative to conduct a

demonstration of several technology options for alternative treatment of low-activity waste (LAW) stored at the Hanford Site's 200 Area tank farms. The objectives of the workshop were to define, evaluate, and rank viable treatment alternatives. The workshop involved a review available information on the technologies proposed for LAW treatment, a discussion on how to combine the technologies into viable treatment sequences other than the current Waste Treatment Plan (WTP) baseline process, and a screening out of technologies and combinations that do not appear viable for short-term (within three years) demonstrations.

- In response to the reorientation of the EM S&T Program, the TFA has been working closely with its users at Hanford, SRS, and INEEL to identify HLW alternatives project opportunities that could be pursued at the sites after the end of the TFA's mission in FY 2002. The following nine opportunities were identified and proposed to the OST Transition Committee in April 2002.

  - **Hanford**: Accelerated Tank Closure; Single-shell Tank Retrieval and Transfer; Alternative Tank Waste Processing; Expanded Capacity of WTP
  - **Savannah River**: Alternative Waste Retrieval and Tank and Equipment Disposition; Accelerated Salt Waste Retrieval, Processing, and Disposition; Accelerated HLW Immobilization
  - **INEEL**: Sodium-bearing Waste Disposition, Calcine Disposition

In addition, TFA has been working with the sites to transition current TFA projects based on the recommendations from the Midyear Review and subsequent transition decisions by the OST Transition Committee following the Review.

- The TFA Technical Team worked with the USG to define and implement a process for identifying and recommending project managers to manage the HLW alternatives projects. Project managers were recommended to the OST Transition Committee in April.

Key FY 2002 deliverables and/or DOE-Headquarters (HQ) level milestones achieved to date include:

- Deployment of Tank Vault Sump Sampler for INEEL (B203), as noted above
- Demonstrate and Test Small Tank Fluidic Sampling and Retrieval System (Accelerated Site Technology Deployment [ASTD]), as noted above
- Deployment of the Pit Viper at Hanford (B352), as noted above
- Deployment of the Modified Beta Gamma Detector in WVDP Tank 8D2 (B361)
- Deployment of the Modified Density Gradient System at SRS (B362)
- Completion of the Salt Processing Project (SPP) Research and Development (R&D) Program Plan [Post-Down selection] Rev. 0 (B570)
- Issued Final Report on Permanganate Filtration Test with Real Waste (B570)
- Completed INEEL Flow Sheet Modeling (B709)
- Completed Report Describing the Solid Secondary Waste Testing and Disposal Strategy at INEEL (B719)

- Delivery of a Technical Basis Necessary to Implement Liquidus Model Waste Loading Improvements at the Defense Waste Processing Facility (DWPF) (B773)

Progress on key technologies/projects:

- Small Tank Fluidic Sampling and Retrieval System (ASTD/B203)
  As highlighted above, the small tanks sampling and retrieval system was successfully demonstrated and tested and installed on Tank 4 at INEEL in October 2001. Due to weather delays, deployment was delayed until spring and is expected to be completed in May 2002.

- Pit Operations and Maintenance System, "Pit Viper" (B352)
  As highlighted above, the Pit Viper was successfully deployed in Hanford tank C-104 in December 2001. Based on the results, recommendations on modifications were developed and delivered to site operations.

- Advanced Design Mixer Pump (ADMP) Modifications and Deployment
  This work focuses on maximizing the performance of mixer pumps in use at Hanford and SRS. Specifically this task focuses on the ADMP refurbishment, cold testing and finally Tank 18 deployment for sludge removal operations (ASTD supported deployment). Design was completed in March 2002, and refurbishment and testing will be completed in June. Work will continue towards deployment under the ASTD task in late FY 2002.

- Retrieval Technologies for Hanford Tank S-102/Pulse-Jet Retrieval System (B362)
  Two proof-of-concept, dual-nozzle, pulsejet systems have been successfully tested – (1) the Russian Mining and Chemical Combine-developed Dual Nozzle Pulsating Mixing Pump (DNPMP) and (2) the AEA Technology (AEAT)-developed fluidic-based pulsejet system. Testing of the DNPMP proved successful, with the DNPMP dissolving test blocks of salt cake/sand and flushing the solids back toward the center of the tank. The trials for the AEAT-developed system showed that it was capable of breaking up compacted sodium-nitrate waste coupons efficiently with both 12-inch and 24-inch diameter charge vessels, with the 24-inch vessel was more efficient. Work in FY 2002 has focused on follow-up dual nozzle pulsejet testing of the AEAT Power Fluidic System for S-102 and initiating prototype design based on Phase I testing results. Design will continue incorporating the results of the Phase II tests conducted in March 2002.

- Nitric Acid, Potassium Permanganate, Oxalic Acid (NPOx) Decontamination System at Idaho Nuclear Technology and Engineering Center (INTEC) (B508)
  Commercially available industrial processes that generate significantly less quantities of waste, yet fulfill decontamination requirements are being investigated as replacement methods for current INTEC decontamination methods. Current baseline approaches are being evaluated, so that a comparative analysis can be conducted with promising candidates, including industrial vendor process demonstrations. Results of the FY 2001 radioactive demonstration are being evaluated to develop

recommendations for improvements to the system for deployment in FY 2002. Additionally, new Russian (A. A. Bochvar Institute) decontamination methods are being evaluated, including a novel strippable coating and electrochemical technique (Electro-Decon) coupled with an ion exchange system to minimize waste volume, which was hot tested in January 2002. Work will continue towards FY 2002 deployment of the NPOx Phase II system, as well as that of the Bochvar Electro-Decon system.

- Salt Processing Project (SPP) (B570)
  FY 2002 work under the SPP primarily focuses on providing R&D results to strengthen the technical baseline for Alpha/Strontium and CSSX and providing data to support conceptual design of the Salt Waste Processing Facility and actinide removal process design.

- Liquidus Model Waste Loading Improvements Implementation for DWPF (B773)
  DWPF waste loading has been most restricted by liquidus temperature. In FY 2001, an improved liquidus temperature model was developed that proved the prediction uncertainty and bias in the current temperature limits was unnecessarily large.
  The new model predicts an improved loading of as much as 10%, representing a cost savings of hundreds of millions of dollars. The basis for implementation of the model was delivered to SRS and current plans are to perform facility software modifications in June 2002 and begin using the new operating envelope processing in August 2002.

3.0 Results of the Review

The Midyear Review was composed of a Midyear Review Meeting in which TFA projects were reviewed for their technical relevance to and impact on OST's two new S&T thrust areas; and a subsequent Management Team Executive Session, in which the results of the project reviews were presented and recommendations regarding the transition of the projects to the new thrust areas were formulated.

3.1 Midyear Review Meeting

The Midyear Review Meeting entailed two types of reviews by the Review Team - technical impact reviews and in-depth technical reviews. Technical impact reviews were conducted on all TFA projects, while the in-depth technical reviews were conducted on two projects. Technical impact reviews involved reviewing TFA projects considering the potential HLW project opportunities (Appendix C) and using technical impact criteria (Appendix D) focused on technical merit, solution viability, and applicability to and impact on reducing high risk/cost areas of site baselines. The reviews were documented using the Review Score Sheet (Appendix E).

In-depth technical reviews involved assessments using project-specific review criteria (Appendix F) focused on the project's relevance to user needs, technical merit and cost effectiveness, environmental safety and health risks, and the viability of delivering the technical solution. The intent of this type of review was to assess the quality and technical validity of the work performed and to determine the readiness of these projects to deliver as scheduled, including determining the commitment and readiness of the site user to accept the technical solutions. The reviews were documented in review reports (Appendix G).

3.1.1 Technical Impact Reviews

All (72) TFA projects underwent the technical impact review by the Review Team. Based on the consensus of the Review Team, 34 projects were recommended for continuation into FY 2003, and 23 projects were recommended for phase-out. Regarding the remaining 15 projects, the Review Team questioned whether these projects should proceed, since additional information was needed in order to make a final recommendation. The specific Review Team recommendations for each project are contained in Appendix H, Section H.1.

3.1.2 In-depth Technical Reviews

For the two TFA projects receiving an in-depth technical review, the following subsections provide brief summaries of the projects, the Review Team comments and recommendations, and the TFA responses. Specific review comments and recommendations by the Review Team and the TFA responses are contained in the review reports for these projects in Appendix G. The project planning information and Review Team comments and recommendations contained in the following sections and Appendix G are based on the OST reorientation planning at the time of the Midyear Review. OST reorientation plans have

evolved since the Midyear Review, such that the project plans and Review Team recommendations contained in these sections may be impacted.

3.1.2.1 Melter Design Improvements – Melt Rate and Noble Metals Investigations (B768)

Relevant site needs include SR01-2036 – Develop Improved HLW Melters, RL-WT-080 – Advanced/Improved Vitrification, and RL-WT-100 – HLW/LAW Melter Operation.

Project Summary

TFA work related to melt rate is structured to augment the existing site tasks to modify the feed and melter chemistry to improve melt rate. Small melt rate furnace tests, pilot melter tests, physical modeling work, and mathematical modeling are components of the TFA program. Melt rate tool development will continue with the goal of improving melt rate prediction capability and also toward establishing an improved understanding of parameters controlling melt rate. Melt rate furnace testing with both dry feed and slurry feeds will be used to investigate methods for improving melt rate. Redox and foaming issues and frit formulation will be major players in this effort. Pilot scale melters will be employed to scale up and demonstrate the small-scale melter tests (crucible and melt rate furnace) and investigate cold cap behavior and contribution to melt rate. Work will continue on improving the cold cap portion of a transient lumped parameter thermal model of the DWPF melter. In addition, a 3-D thermal fluids model of the DWPF melter will be used to evaluate potential benefits resulting the introduction of a bubbler. Physical modeling of the bubbler will accompany the use of the 3-D model. Melt rate furnace tests and mini-melter tests as well as modeling will be used to evaluate and improve melting rates for INEEL feeds and will be closely integrated with the glass formulation task in B773. The SRS and INEEL work will be extended to Hanford needs as appropriate.

Accumulation of noble metals has been demonstrated to shorten the life of HLW glass melters in Europe. Recent analyses by WVDP show significant reductions in melter power as a result of noble metals accumulation. The DWPF melter was designed before the severity of the effect of noble metals shorting of melter electrodes was demonstrated at PAMELA in Mol, Belgium. Although current operation is at a low noble metals concentration, the next feed batch will be substantially higher in noble metals. Operating experience and data from the Savannah River Technology Center Integrated DWPF Melter System, the WVDP melter, and German experience will be used to estimate the impact of noble metals on DWPF operation. A 3-D thermal/electric field model of the DWPF melter will be employed to identify possible data trends indicative of noble metal accumulation. Large-scale melter tests using a noble metals surrogate are planned as an approach to verify and, perhaps, provide additional information on noble metals behavior. The development effort will also focus on evaluating ways to prevent or minimize the accumulation of noble metals. Identification of suitable surrogates for noble metals and preliminary modeling efforts are in progress at Pacific Northwest National Laboratory (PNNL). This approach will be extended to INEEL and ORP as appropriate.

Review Comments/Recommendations

The Review Team had the following recommendations:

1) Melt Rate Improvement. The change in frit formulation to improve melt rate based on the melt rate furnace tests should be confirmed on the mini-melter and proceed to DWPF demonstration if no adverse effects are detected. Development of the slurry fed melt rate furnace (SFMRF) should continue to provide a better correlation between the melt/solids interface reactions and melt rate. The suite of tests developed during this program should all be used to minimize the cost of evaluating future changes to either frit composition or feed preparation. Since the goals overlap and the experimental methods are complementary, a close tie should be developed between this program and the work by Dr. Hrma on project B7A1. The potential for major cost reductions from this effort is sufficient justification for continuation in development of these tools and improving their application.

2) Bubblers. The development of a functional bubbler system is probably the most significant part of this program. The ability to improve melt characteristics is not always available through change in feed composition. The ability to affect the temperature transition zones by providing better heat transfer from internal agitation would be especially advantageous in these cases. The lack of integration of this project with the work being done by Duratek and Catholic University greatly reduces the potential for applying benefits from this project to Hanford, as well as eliminating any benefits to the SRS from the DOE-funded Duratek and Catholic University programs. DOE should take the lead by reevaluating or modifying the Duratek agreement to make the information available to all the sites. Development of a functional bubbler should be a high priority activity

3) Noble Metals. A thorough review of past noble metals modeling should be undertaken, including the assumptions. The use of a mathematical model of fluid flow to predict the effects of large conductive deposits on the melter bottom is excellent. However, there is some skepticism that unless the uncertainties in previous studies can be resolved, the models will be only qualitative in nature. Experiments should be conducted at as large a scale as possible to provide the best data. Verification of the model validity will be a difficult task.

TFA Response

TFA concurred with the Review Team recommendations and plans to incorporate them into the project. Further, relative melt rate improvement with the Frit 320 formulation has been confirmed in mini-melter testing. Testing in the SFMRF is scheduled to begin in June and development of SFMRF will continue. TFA will continue to work closely with Dr. Hrma at PNNL and, as schedules permit, the programs will be integrated. Development of a functional bubbler is being given very high priority. Near term efforts are focusing on the interface with the cold cap and foam layers, physical modeling to define design and operating parameters, and wear testing. Integration of the bubbler with Hanford LAW and HLW programs is planned but

is currently somewhat limited by the DOE agreement with Duratek and contingent on the outcomes of the OST reorientation planning.

3.1.2.2 Enhanced Grout Formulations for Tank Closure (B923)

Relevant site needs include OH-WV-914 – Development of Grout for In-Situ Closure, ID-2.1.46 and ID-2.1.47 – Management of Tank Heel Liquids and Solids, and SR01-2051 – Technology to Mitigate Effects of Technetium under Tank Closure Conditions.

Project Summary

To support tank/site-specific, performance requirements for tank closure materials, this project will develop an improved science understanding of grout chemistry. This will allow sites to quickly focus on the key grout formulations that will meet their needs. It will also generate a repository of grout formulation information that has begun to be developed over the last few years as the sites have started to deal with tank closure.

This project will document the current DOE tank site state-of-the-art for grouting tanks, will do comparison testing of several grout formulations currently used by sites, will identify and test the effectiveness of grout formulation enhancements both in the laboratory and through preliminary field tests, and will access Russian grout chemistry knowledge and expertise.

Review Comments/Recommendations

The Review Team had the following recommendations:

A comprehensive report covering the entire project should be written. Grouting of tanks is an integral part of tank closure and the existence of such a report will allow all participants in the process to efficiently focus their efforts on tank closure. It is important that meaningful peer reviews be obtained on the reports, journal publications, etc. generated under this project to enhance credibility.

Results of the survey of site needs should be documented and distributed to the sites for their use. This output will satisfy a long-standing need to pull together diverse grout information for HLW containment.

Consideration should be given to an expanded follow-on program to continue exploration of special additives and to address mechanistic understanding of long-term performance of the grouts. Specifically, Hanford site grout requirements should be considered. This work on grout performance should be extended to include Resource and Conservation Recovery Act (RCRA) constituents of interest to the sites.

Benign tracers should be considered as an additive to the grouts being tested. This could provide information on the extent of any future leakage after tank closure.

The benefit to performance confirmation of leach testing of core samples from the engineering scale monoliths should be given further consideration.

TFA Response

TFA concurred with the Review Team recommendations and plans to incorporate them into the project. Further, a comprehensive report covering this project will be prepared at the end of FY 2002. A status of the work to date was presented at the American Chemical Society last year. A summary of the work both nationally and internationally is in progress with assessment of the applicability to DOE sites. The summary report will be completed by the end of the fiscal year. This report will serve as a handbook describing the current state of the art. TFA agrees that the scope should be extended to include tracers and RCRA constituents. Such work will be proposed to address grouting options under consideration at both Hanford and SRS. The concepts recommended are a logical extension of this work to "low curie salt" immobilization options.

3.2 Management Team Executive Session

During the Management Team Executive Session on March 14, 2002, the consensus results of the Review Team on all (72) TFA projects were presented for review and discussion by the Management Team. Based on the results of the Review Team and site user input, 38 TFA projects were recommended for continuation into FY 2003 by the Management Team. Thirty-four projects were recommended for phase-out. The specific Management Team recommendations for each project are contained in Appendix H, Section H.2.

Appendix A
FY 2002 TFA MIDYEAR REVIEW AGENDA
March 11-14, 2002
Hilton Salt Lake City Center – Salt Lake City, Utah

Monday, March 11, 2002		
7:00a-8:00a	Registration, Continental Breakfast – Foyer of Grand Ballroom	
7:00a-7:30a	TAG Meeting – Topaz Room	Wally Schulz, TAG
7:30a-8:00a	Review Team Meeting – Topaz Room	Tom Ferns, DOE-RL; Cheryl Nickola, PNNL
Plenary Session – Grand Ballroom		
Time	**Presentation**	**Presenter(s)**
8:00a-8:15a	Welcome/Introductions/Meeting Objectives/Agenda Overview	Ted Pietrok, DOE-RL; Tom Brouns, PNNL
8:15a-9:30a	DOE-HQ, TFA Program Update	Teresa Fryberger, DOE-HQ; Kurt Gerdes, DOE-HQ; Nick Machara, DOE-HQ; Ken Picha, DOE-HQ
9:30a-10:00a	Break	
10:00a-11:00a	INEEL Update and Opportunities for High Risk/Cost Reduction in Baseline	Jim Valentine, BBWI
11:00a-12:00p	Hanford Site Update and Opportunities for High Risk/Cost Reduction in Baseline	Joe Cruz, DOE-ORP
12:00p-1:30p	Lunch, Review Team Executive Session (Topaz Room)	
1:30p-2:30p	Savannah River Site Update and Opportunities for High Risk/Cost Reduction in Baseline	Pat Suggs, DOE-SR
2:30p-3:00p	Break	
3:00p-3:30p	West Valley Demonstration Project Update	John Drake, DOE-WV
3:30p-4:00p	Oak Ridge Reservation Update	Jerry Harness for Jacquie Noble-Dial, DOE-OR
4:00p-4:30p	High Risk/Cost Reduction Opportunities in HLW	Ted Pietrok, DOE-RL; Tom Brouns, PNNL
4:30p-4:45p	Review Process	Tom Ferns, DOE-RL; Cheryl Nickola, PNNL
4:45p-5:30p	Salt Processing Project Update and Lessons Learned (TFA B570)	**Presenter:** Harry Harmon, PNNL. **Review Team:** Jimmy Bell,TAG/RTL; Wally Schulz, TAG; John Roecker, TAG; Pat Suggs, SRS; Rich Edwards, WSRC
5:30p	Adjourn	
6:00p-8:00p	Reception/Dinner (No-host) – Alpine Ballroom	

Tuesday, March 12, 2002

7:00a-8:00a Continental Breakfast – Foyer of Alpine Ballroom

7:00a-8:00a Review Team Executive Session – Topaz Room

Session A – SRS Retrieval Process Enhancements and Alternatives, Alpine East Room
Facilitator: Gary Josephson
Moderator(s): Pete Gibbons, Retrieval TIM, NHC; Mike Terry, Safety TIM, LANL; Phil McGinnis, Pretreatment TIM, UT-Battelle
Review Session Lead: Paul Scott, TAG

Time	Presentation	Presenter	Review Team
7:45a-8:00a	Session Introduction	Moderator(s)	N/A
8:00a-8:30a	New Waste Retrieval System/SRS Retrieval Roadmap (TFA B359)	Brannen Adkins, SRS	**John Roecker, TAG/RTL** Paul Scott, TAG Wally Schulz, TAG Gary Eller, TAG Pat Suggs, SRS Jerry Morin, WSRC
8:30a-9:00a	Advanced Design Mixer Pump (ADMP) for SRS, including Tank 18 ADMP Deployment (ASTD) (TFA B359)	Brannen Adkins, SRS	**Paul Scott, TAG/RTL** John Roecker, TAG Joe Gentilucci, TAG Gary Eller, TAG Pat Suggs, SRS Jerry Morin, WSRC
9:00a-9:30a	Dual Coriolis for In-tank Slurry Monitoring System (DCMS) (TFA B278)	Rajiv Srivastava, FIU Anindra Mazumdar, FIU	**Bruce Kowalski, TAG/RTL** Paul Scott, TAG John Roecker, TAG Pat Suggs, SRS Jerry Morin, WSRC
9:30a-10:00a	Tank Leak Site Self Sealing Enhancements (TFA B157); Remote Tank Leak Repair (TFA B157)	Bruce Wiersma, SRS	**Larry Tavlarides, TAG/RTL** Paul Scott, TAG John Roecker, TAG Dawn Kaback, TAG Bob Erdmann, TAG Pat Suggs, SRS Jerry Morin, WSRC

Session B – Hanford Interim Stabilization Enhancements and Alternatives, Alpine West Room
Facilitator: Betty Carteret
Moderator(s): Pete Gibbons, Retrieval TIM, NHC; Phil McGinnis, Pretreatment TIM, UT-Battelle; Bill Holtzscheiter, Immobilization TIM, WSRC
Review Session Lead: Dawn Kaback, TAG

Time	Presentation	Presenter	Review Team
8:15a-8:30a	Session Introduction	Moderator(s)	N/A
8:30a-9:00a	Hanford Sludge Chemistry, Solids Formation, and Transport (TFA B554)	Tim Welch, ORNL	**Major Thompson, TAG/RTL** George Vandegrift, TAG Jimmy Bell, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP
9:00a-9:30a	Understand Evaporator Chemistry at Hanford (TFA B566)	Dan Herting, FH	**George Vandegrift, TAG/RTL** Major Thompson, TAG Jimmy Bell, TAG Wally Schulz, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP
9:30a-10:00a	Break		

10:00a-10:30a	Break			10:00a-11:30a	**Technical Review:** Enhanced Grout Formulations for Tank Closure (TFA B923)	Christine Langton, SRS	**Bob Erdmann, TAG/RTL** Tom Weber, TAG Gary Eller, TAG Dawn Kaback, TAG Ryan Dodd, CHG Joe Cruz, ORP Jim Valentine, BBWI
10:30a-11:00a	SRS Sludge Chemistry, Solids Formation, and Transport (TFA B554)	Rodney Hunt, ORNL	**Major Thompson, TAG/RTL** Jimmy Bell, TAG Paul Scott, TAG Pat Suggs, SRS Jerry Morin, WSRC				
11:00a-11:30a	Aluminum Removal from Tank Sludges (TFA B555)	Don Palmer, ORNL	**Wally Schulz, TAG/RTL** George Vandegrift, TAG Major Thompson, TAG Pat Suggs, SRS Jerry Morin, WSRC				
11:30a-12:00p	Alternative Air Filtration Technology for SRS Tanks (TFA B171)	Duane Adamson, SRS	**Larry Tavlarides, TAG/RTL** Joe Gentilucci, TAG Bob Erdmann, TAG Pat Suggs, SRS Jerry Morin, WSRC	11:30a-12:00p	Pipeline Blockage Locating and Unplugging (TFA B376); Waste Conditioning/Slurry Transfer (TFA B376)	Rajiv Srivastava, FIU	**Paul Scott, TAG/RTL** Jimmy Bell, TAG Gary Eller, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP
12:00p-1:15p	Lunch, Review Team Executive Session (Topaz Room)			12:00p-1:45p	Lunch, Review Team Executive Session (Topaz Room)		

Session C – SRS Vitrification Process Enhancements and Alternatives, Alpine East Room Facilitator: Joe Westsik Moderator(s): Phil McGinnis, Pretreatment TIM, UT-Battelle; Bill Holtzscheiter, Immobilization TIM, WSRC Review Session Lead: Joe Gentilucci, TAG				**Session D – Hanford SST Waste Disposition Enhancements and Alternatives, Alpine West Room** Facilitator: Betty Carteret Moderator(s): Mike Terry, Safety TIM, LANL; Pete Gibbons, Retrieval TIM, NHC; Phil McGinnis, Pretreatment TIM, UT-Battelle Review Session Lead: John Roecker, TAG			
Time	**Presentation**	**Presenter**	**Review Team**	**Time**	**Presentation**	**Presenter**	**Review Team**
1:15p-1:30p	Session Introduction	Moderator(s)	N/A				
1:30p-2:00p	DWPF Recycle Stream (TFA B566)	Bill Wilmarth, WSRC	**Wally Schulz, TAG/RTL** George Vandegrift, TAG Joe Gentilucci, TAG Pat Suggs, SRS Rich Edwards, WSRC	1:45p-2:00p	Session Introduction	Moderator(s)	N/A
2:00p-2:30p	Evaporator Chemistry (TFA B566)	David DePaoli, ORNL	**Jimmy Bell, TAG/RTL** George Vandegrift, TAG Wally Schulz, TAG Pat Suggs, SRS Rich Edwards, WSRC	2:00p-2:30p	CNDE Requirements Evaluation (TFA B175); NDE of Concrete Walls and Dome of SST (TFA B175)	Bruce Thompson, CNDE at ISU	**Larry Tavlarides, TAG/RTL** Bruce Kowalski, TAG Gary Eller, TAG Bob Erdmann, TAG Ryan Dodd, CHG Ken Rueter, WGI (Optional) Joe Cruz, ORP
2:30p-2:45p	Break			2:30p-2:45p	Break		
2:45p-3:15p	Glass Removal Methods (TFA B777)	Mike Smith, SRS	**Joe Gentilucci, TAG/RTL** Tom Weber, TAG Frank Woolley, TAG Pat Suggs, SRS Rich Edwards, WSRC Ken Rueter, WGI	2:45p-3:15p	Hanford Vehicle-Based SST Retrieval – Tank C-104 (TFA B367)	Jerry Cammann, CHG	**John Roecker, TAG/RTL** Paul Scott, TAG Dawn Kaback, TAG Bob Erdmann, TAG Ryan Dodd, CHG Joe Cruz, ORP
3:15p-3:45p	Melt Rate Improvement for HLW Glass (TFA B7A1)	Pavel Hrma, PNNL	**Joe Gentilucci, TAG/RTL** Tom Weber, TAG Frank Woolley, TAG Larry Tavlarides, TAG Pat Suggs, SRS Rich Edwards, WSRC Ken Rueter, WGI	3:15p-3:45p	SST from Potentially Leaking Tanks (TFA B3S2)	Brian Hatchell, PNNL	**Paul Scott, TAG/RTL** Bob Erdmann, TAG Dawn Kaback, TAG Ryan Dodd, CHG Joe Cruz, ORP
3:45p-4:00p	Break			3:45p-4:00p	Break		

4:00p-5:30p	**Technical Review:** Melter Design Improvements - Melt Rate and Noble Metals Investigations (TFA B768) Impact Review: Melter Design Improvements - DWPF Melter Improvements (TFA B768)	Doug Witt, SRS David Peeler, SRS	**Joe Gentilucci, TAG/RTL** Tom Weber, TAG Frank Woolley, TAG Bruce Kowalski, TAG Pat Suggs, SRS Rich Edwards, WSRC Ken Rueter, WGI	4:00p-4:30p	Hanford SST Retrieval - Low Water Volume Retrieval Technology (TFA B362); Alternative Pulse Jet Retrieval Technology (TFA B362)	Jerry Cammann, CHG	**Dawn Kaback, TAG/RTL** Paul Scott, TAG John Roecker, TAG Bob Erdmann, TAG Ryan Dodd, CHG Joe Cruz, ORP
				4:30p-5:00p	Hanford Salt Cake Dissolution (TFA B554)	Dan Herting, FH	**George Vandegrift, TAG/RTL** John Roecker, TAG Larry Tavlarides, TAG Major Thompson, TAG Ryan Dodd, CHG Joe Cruz, ORP
				5:00p	Adjourn		
5:30p	Adjourn						
5:30p-6:00p	Review Team Executive Session (Topaz Room)			5:30p-6:00p	Review Team Executive Session (Topaz Room)		

Wednesday, March 13, 2002

7:00a-8:00a Continental Breakfast – Foyer of Alpine Ballroom

7:00a-8:00a Review Team Executive Session – Topaz Room

Session E – Hanford Waste Processing Enhancements and Alternatives, Alpine East Room Facilitator: Gary Josephson/Joe Westsik Moderator(s): Bill Holtzscheiter, Immobilization TIM, WSRC; Phil McGinnis, Pretreatment TIM, UT-Battelle Review Session Lead: Tom Weber, TAG				**Session F – SRS Salt Cake Waste Disposition Enhancements and Alternatives, Alpine West Room** Facilitator: Gary Josephson Moderator(s): Pete Gibbons, Retrieval TIM, NHC; Phil McGinnis, Pretreatment TIM, UT-Battelle Review Session Lead: George Vandegrift, TAG			
Time	**Presentation**	**Presenter**	**Review Team**	**Time**	**Presentation**	**Presenter**	**Review Team**
7:45a-8:00a	Session Introduction	Moderator(s)	N/A	7:45a-8:00a	Session Introduction	Moderator(s)	N/A
8:00a-8:30a	Hanford Processing Rate Improvement Sulfate in LAW (TFA B769)	John Vienna, PNNL	**Tom Weber, TAG/RTL** Joe Gentilucci, TAG Frank Woolley, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP	8:00a-8:30a	Modified Density Gradient Retrieval Technology – SRS Salt Cake Dissolution (TFA B362)	Brannen Adkins, SRS	**Paul Scott, TAG/RTL** George Vandegrift, TAG Major Thompson, TAG Jerry Morin, WSRC Pat Suggs, SRS
8:30a-9:00a	Reduction in Processing Constraints and Secondary Phases (TFA B773)	David Peeler, SRS	**Tom Weber, TAG/RTL** Joe Gentilucci, TAG Frank Woolley, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP	8:30a-9:00a	SRS Salt Cake Dissolution (TFA B554)	Bill Van Pelt, SRS	**Major Thompson, TAG/RTL** Paul Scott, TAG George Vandegrift, TAG Jerry Morin, WSRC Pat Suggs, SRS
9:00a-9:30a	Solubility of Troublesome Components in HLW Glass (TFA B773)	John Vienna, PNNL	**Tom Weber, TAG/RTL** Joe Gentilucci, TAG Frank Woolley, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP	9:00a-9:30a	Removal of Sr and TRU Elements from Alkaline Tank Waste Using In-Situ Generated Magnetite (TFA B5A1)	Hassan Arafat, ANL	**Major Thompson, TAG/RTL** George Vandegrift, TAG Wally Schulz, TAG Jerry Morin, WSRC Pat Suggs, SRS
9:30a-10:00a	Cold Crucible Melter Evaluation (TFA B7S2)	Connie Herman, SRS	**Tom Weber, TAG/RTL** Joe Gentilucci, TAG Frank Woolley, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP	9:30a-10:00a	Solid-liquid Separations Filter Optimization and Process Enhancement (TFA B584)	Steve Schlahta, PNNL	**Major Thompson, TAG/RTL** Larry Tavlarides, TAG John Roecker, TAG Jerry Morin, WSRC Pat Suggs, SRS Jim Valentine, BBWI
10:00a-10:30a	Break			10:00a-10:30a	Break		

				Session G – INEEL Waste Processing Enhancements and Alternatives, Alpine West Room Facilitator: Joe Westsik Moderator(s): Bill Holtzscheiter, Immobilization TIM, WSRC Review Session Lead: Frank Woolley, TAG			
10:30a-11:00	Validation and Method Development to Allow Routine Analysis of DOE Waste Forms by LA/ICP/MS (TFA B2A1)	Michael Alexander, PNNL	**Bruce Kowalski, TAG/RTL** Gary Eller, TAG Tom Weber, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP	10:30a-11:00	Universal Solvent Extraction Process (UNEX) (TFA B501)	Terry Todd, BBWI	**Jimmy Bell, TAG/RTL** George Vandegrift, TAG Major Thompson, TAG Jim Valentine, BBWI
11:00a-11:30a	High Caustic Enhanced Sludge Washing with Recycle, including Modeling Support (TFA B555)	Gregg Lumetta, PNNL	**George Vandegrift, TAG/RTL** Major Thompson, TAG Wally Schulz, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP	11:00a-11:30a	Waste Treatment Process Flowsheet Model (TFA B709); Conditioning and Immobilization of LAW – Residual Solids (TFA B719); Conditioning and Immobilization of LAW – Foster Wheeler Process (TFA B719); Conditioning of HLW for Immobilization – Site Integration (TFA B769)	Bill Holtzscheiter, SRS	**Frank Woolley, TAG/RTL** Larry Tavlarides, TAG Tom Weber, TAG Joe Gentilucci, TAG Jim Valentine, BBWI Sharon Robinson, ORNL Jerry Harness, ORR
11:30a-12:00p	Removal of Chromium from Alkaline Tank Waste through Oxidative Alkaline Leaching (TFA B5S1)	Brian Rapko, PNNL	**George Vandegrift, TAG/RTL** Major Thompson, TAG Jimmy Bell, TAG Ryan Dodd, CHG Ken Rueter, WGI Joe Cruz, ORP	11:30a-1:00p	Lunch, Review Team Executive Session (Topaz Room)		
12:00p-1:00p	Lunch, Review Team Executive Session (Topaz Room)						

Session H - TIM Updates for Remaining TFA Projects, Alpine Ballroom Facilitator: Betty Carteret/Joe Westsik Review Session Lead: Wally Schulz, TAG/Jimmy Bell, TAG			
Time	**Presentation**	**Presenter**	**Review Team**
	Safety		
1:00p-1:25p	**HLW Tank Corrosion Control and Monitoring (TFA B143)** Hanford EN Corrosion Probe, including Argentina DST Corrosion Studies; SRS EN Combined Corrosion and Species Probe Development; ORNL Stainless Steel Corrosion Probe Development; INEEL Stainless Steel Corrosion Probe	Mike Terry	**Larry Tavlarides, TAG/RTL** Bruce Kowalski, TAG Gary Eller, TAG Jim Valentine, BBWI Sharon Robinson, ORNL Jerry Harness, ORR Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI Rich Edwards, WSRC Pat Suggs, SRS
1:25p-1:35p	**Tank Leak Mitigation (TFA B157)** Leak Mitigation for Hanford, Leak Mitigation Barriers, Apatite Reactive Zone	Mike Terry	**Dawn Kaback, TAG/RTL** Tom Weber, TAG Bob Erdmann, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI
1:35p-1:50p	**Tank Integrity Inspection Techniques (TFA B175)** Small Roving Annulus Inspection Vehicle; Remotely Operated NDE System with DST Inspection System – TSAFT	Mike Terry	**Bruce Kowalski, TAG/RTL** Paul Scott, TAG Gary Eller, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI Rich Edwards, WSRC Pat Suggs, SRS
1:50p-2:00p	**Pre-Closure Interim Tank Maintenance (TFA B1S1)** Generic HLW Tank Lay-Up Alternatives Evaluation Methodology	Mike Terry	**Dawn Kaback, TAG/RTL** Bob Erdmann, TAG John Roecker, TAG Jim Valentine, BBWI Sharon Robinson, ORNL (Optional) Jerry Harness, ORR (Optional) Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI Rich Edwards, WSRC Pat Suggs, SRS John Drake, WV

	Characterization		
2:00p-2:10p	**Sludge Mapping and Volume Estimates (TFA B201)**	Martin Edelson	**Bruce Kowalski, TAG/RTL** Gary Eller, TAG Jim Valentine, BBWI Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI Rich Edwards, WSRC Pat Suggs, SRS
2:10p-2:30p	**Residual Waste Sampling (TFA B203)** Develop and Deploy Vault Sump Sampler; Modify, Test, and Certify LDUA Sampling End Effector; Develop Simple Tank Heel Sampler	Tom Thomas	**Bruce Kowalski, TAG/RTL** Major Thompson, TAG Bob Erdmann, TAG Jim Valentine, BBWI
2:30p-2:45p	Break		
	Retrieval		
2:45p-2:55p	**Remote Systems for Pit Operations and Maintenance (TFA B352)** Hanford Pit Operations Enhancements	Pete Gibbons/ Barry Burks	**Paul Scott, TAG/RTL** John Roecker, TAG Dawn Kaback, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI (Optional)
2:55p-3:10p	**Waste Mobilization and Mixing (TFA B359)** Data Analysis and Modeling of AZ-101 Mixer Pump Data; Mixer Pump Operational Improvements	Pete Gibbons	**John Roecker, TAG/RTL** Paul Scott, TAG Dawn Kaback, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI Rich Edwards, WSRC Pat Suggs, SRS
3:10p-3:30p	**Heel Retrieval from Obstructed Tanks (TFA B361)** Heel Retrieval from WVDP Large Tanks – Floor-Wall Washing; Heel Retrieval from WVDP Large Tanks - Burnishing Tool; Heel Retrieval from INEEL HLW Tanks - Sprayball-SteamJet **Horizontal and Small Tank Sludge Mixing and Retrieval (TFA B382)** Cleaning of West Valley Small Vertical Tanks and Associated Piping	Pete Gibbons/Barry Burks	**Wally Schulz, TAG/RTL** Paul Scott, TAG Bob Erdmann, TAG Jim Valentine, BBWI John Drake, WV

3:30p-3:40p	**Low Volume Salt Cake Dissolution Retrieval (TFA B362)** Topographical Mapping System (TMS)	Pete Gibbons	**Bruce Kowalski, TAG/RTL** Joe Gentilucci, TAG Gary Eller, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI
3:40p-3:50p	**Chemical Cleaning of Tanks (TFA B363)** Chemical Tank Cleaning at SRS; Chemical Tank Cleaning at INEEL	Pete Gibbons	**George Vandegrift, TAG/RTL** Major Thompson, TAG Jimmy Bell, TAG Jim Valentine, BBWI Rich Edwards, WSRC Pat Suggs, SRS
3:50p-4:05p	**Unobstructed Tank Heel Retrieval (TFA B367)** Russian PMP Application for Hanford A200 Series Retrieval; SRS Disposable Crawler Deployment	Pete Gibbons	**Paul Scott, TAG/RTL** Major Thompson, TAG Larry Tavlarides, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI Rich Edwards, WSRC Pat Suggs, SRS
	Pretreatment		
4:05p-4:15p	**Decon and Filter Leach Processes Waste Volume Reduction (TFA B508)** NPOx Decontamination System; Identification and Evaluation of Emerging Technologies	Phil McGinnis	**George Vandegrift, TAG/RTL** John Roecker, TAG Jimmy Bell, TAG Jim Valentine, BBWI
4:15p-4:25p	**Sludge Washing and Dissolution (TFA B555)** ORNL T1 and T2 Sludge Washing and Dissolution	Phil McGinnis	**Jimmy Bell, TAG/RTL** Larry Tavlarides, TAG Wally Schulz, TAG Jerry Harness, ORR Sharon Robinson, ORNL
	Immobilization		
4:25p-4:35p	**Testing and Prediction of Long-Term Waste Glass Performance (TFA B748)** Russian In-Situ Testing	Bill Holtzscheiter	**Tom Weber, TAG/RTL** Dawn Kaback, TAG Bob Erdmann, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI

4:35p-4:45p	**Improve Waste Loading in HLW Glass (TFA B773)** Liquidous Model Implementation	Bill Holtzscheiter	**Joe Gentilucci, TAG/RTL** Tom Weber, TAG Frank Woolley, TAG Larry Tavlarides, TAG Joe Cruz, ORP Ryan Dodd, CHG Ken Rueter, WGI Rich Edwards, WSRC Pat Suggs, SRS
4:45p-4:55p	**Remote Disassembly of HLW Melters and Other Processing Equipment (TFA B777)** Dismantlement, Size Reduction of Failed Vitrification Equipment	Bill Holtzscheiter	**Frank Woolley, TAG/RTL** John Roecker, TAG Joe Gentilucci, TAG Jerry Harness, ORR (Optional) Sharon Robinson, ORNL (Optional) Rich Edwards, WSRC Pat Suggs, SRS John Drake, WV Joe Cruz, ORP (Optional) Ken Rueter, WGI (Optional)
4:55p-5:30p	Closing Plenary	Ted Pietrok, DOE-RL	
5:30p	Adjourn		
5:30p-6:00p	Review Team Executive Session (Topaz Room)		

Thursday, March 14, 2002					
7:00a-8:00a	Continental Breakfast – Foyer of Alpine Ballroom				
Session A – TAG Meeting, Topaz Room			**Session B – Management Team Executive Session, Alpine Ballroom**		
Time	**Presentation**	**Presenter**	**Time**	**Presentation**	**Presenter**
8:00a-3:00p	TAG Meeting (TAG Members ONLY)	Wally Schulz, Chair	8:00a-3:00p	Management Team Executive Session (DOE HQ and TFA Management and User Representatives ONLY)	Ted Pietrok, DOE-RL

Appendix B – Review Team

B.1 Tanks Focus Area (TFA) Fiscal Year 2002 Midyear Review – Review Team

B.1.1 U.S. Department of Energy- (DOE-) Headquarters (HQ) and TFA Management

- **Kurt Gerdes**, DOE-HQ, Office of Environmental Management (EM) (EM-50)
- **Dan McCabe**, DOE-HQ, EM-50
- **Jeff Walker**, DOE-HQ, EM-50
- **Nick Machara**, DOE-HQ, EM-40
- **Ken Picha**, DOE-HQ, EM-22
- **Paul Kruger**, DOE Richland Operations Office (DOE-RL), Associate Manager for Science and Technology
- **Ted Pietrok**, DOE-RL, TFA Program Manager

B.1.2 User Representatives

DOE Site Representatives

- **Joe Cruz**, Site Representative, Hanford Site
- **John Drake**, Site Representative, West Valley Demonstration Project
- **Pat Suggs**, Site Representative, DOE Savannah River Operations Office
- **Keith Lockie**, Site Representative, DOE Idaho Operations Office
- **Jerry Harness for Jacquie Noble-Dial**, Site Representative, DOE Oak Ridge Operations Office

Contractor User Steering Group

- **Laurene Rowell**, West Valley Nuclear Services, West Valley Demonstration Project
- **Ryan Dodd (Ken Gasper and Anne-Marie Choho support)**, CH2M Hill Hanford Group, Hanford Site
- **Paul Rutland for Ken Rueter**, Washington Group International, Hanford Site
- **Jerry Morin or Rich Edwards**, Westinghouse Savannah River Company, Savannah River Site
- **Sharon Robinson or Jack Watson**, Oak Ridge National Laboratory, Oak Ridge Reservation
- **Jim Valentine**, Bechtel BWXT Idaho, LLC, Idaho National Engineering and Environmental Laboratory

B.1.3 TFA Technical Advisory Group

- **Wally Schulz**, Chair, W2S Company, Inc.
- **Jimmy Bell**, Deputy Chair and Member-at-Large, Bell Consultants, Inc.
- **Gary Eller**, Member-at-Large, Los Alamos National Laboratory
- **John Roecker**, Member-at-Large, Consultant
- **Bruce Kowalski**, Characterization and Monitoring Subgroup, Consultant
- **George Vandegrift**, Pretreatment Subgroup, Argonne National Laboratory
- **Major Thompson**, Pretreatment Subgroup, Westinghouse Savannah River Company
- **Paul Scott**, Retrieval Subgroup, Pacific Northwest National Laboratory
- **Tom Weber**, Immobilization Subgroup, Consultant
- **Joe Gentilucci**, Immobilization Subgroup, JAG Technical Services, Inc.
- **Frank Woolley**, Immobilization Subgroup, Consultant
- **Robert Erdmann**, Closure Subgroup, Consultant
- **Dawn Kaback**, Closure Subgroup, Concurrent Technologies Corporation
- **Larry Tavlarides**, Safety Subgroup, Syracuse University

Appendix C – Potential HLW Project Opportunities

C.1 Potential High-Level Waste (HLW) Project Opportunities

C.1.1 Idaho National Engineering and Environmental Laboratory

Sodium Bearing Waste (SBW) Disposition

Provide science and technology (S&T) required to enable disposition of the remaining liquid SBW and close HLW tanks to meet cease use schedule and reduce mortgage. Potential project elements and alternatives include both thermal and non-thermal treatment options such as steam reforming and ion exchange with subsequent stabilization, calcination with Maximum Achievable Control Technology-compliant upgrades, alternate waste forms and disposal options, waste tank residuals retrieval, solids disposition, and closure of the waste tanks.

Calcine Disposition

Establish baseline for disposition of calcine waste and bin sets. Potential project elements and alternatives include calcine characterization and retrieval, direct disposal of calcine into HLW canisters, disposal of calcine with minimal processing/stabilization, dissolution, full separations, and subsequent low-activity waste (LAW) and high-activity waste immobilization, direct vitrification, and closure of the bin sets.

C.1.2 Hanford

Alternative Tank Waste Processing

Provide S&T to enable disposal of as much waste as possible without processing through the Waste Treatment Plant (WTP). Project would provide options for disposal and/or processing in-, or near-tank lower curie or transuranic wastes that do not require HLW processing and vitrification through the WTP. Potential project elements and alternatives include minimal processing options including thermal and non-thermal methods for stabilization, separations, salt recovery, or production of alternate LAW forms, and limited-retrieval and in-place disposal of low-risk tanks and wastes.

Expand Capability of the WTP

Develop methods to improve the throughput, capacity, and reduce the number of waste packages produced by the WTP. Emphasize S&T to reduce the limited risks and costs within the HLW flowsheet, and especially focus on improvements in the LAW flowsheet. Potential project elements and alternatives include HLW and LAW vitrification improvements, alternative pretreatment/separations operations, LAW loading and melt rate improvements,

glass durability, alternate LAW forms, and consideration of secondary waste forms (e.g., salt recovery)

Single-shell Tank (SST) Retrieval and Transfer

Provide S&T to enable SST waste retrieval and significantly reduce $13B baseline costs through technology improvements, alternatives, and technical risk reduction. Potential project elements and alternatives include waste mixing and mobilization technologies, saltcake dissolution, leak detection and mitigation, waste transfer plugging prevention and unplugging, tank integrity maintenance, and water management and retrieval staging methods.

Early Tank Closure

Close several HLW tanks using operational or interim closure concepts in the next few years. Provide needed S&T to support accelerated closure schedule, and provide technology to support future tank closure decisions. Potential project elements and alternatives include enabling retrieval technologies, stabilizing methods and materials for waste residuals and tank, and closure monitoring methods.

C.1.3 Savannah River Site

Accelerate Salt Waste Retrieval, Processing, and Disposition

Provide S&T to accelerate parallel paths for salt treatment to minimize costs. Potential project elements and alternatives include saltcake dissolution and retrieval, lower cost alternatives for solid-liquid separation (including filter cleaning), cesium removal, and actinide removal, process monitoring, and disposal options for minimally-treated salt waste.

Accelerate HLW Immobilization

Enhance throughput and reduce number of HLW canisters within existing Defense Waste Processing Facility to significantly reduce costs and accelerate project. Potential project elements and alternatives include new or advanced melter designs and technology, acceptance of multi-phase glasses (scientific basis), waste loading and melt-rate improvements, facility and flowsheet optimization to reduce bottlenecks, waste conditioning, and melter change-out/disassembly

Accelerate Waste Retrieval and Tank and Equipment Disposition

Increase feed rates of waste for disposition through S&T to accelerate waste retrieval and reduce tank farm storage and operations bottlenecks. Potential project elements and alternatives include waste mixing and mobilization improvements for sludge, obstructed tank, unobstructed tank, and annulus retrieval, leak detection and mitigation, equipment size reduction and disposition, tank farm water management (e.g., evaporation), waste transfer, etc.

Appendix D – Technical Impact Review Criteria

D.1 Technical Impact Reviews

The following review criteria were developed to guide the review of Tanks Focus Area (TFA) projects for their high risk/cost reduction impact on site baselines.

Review Criteria

Technical Merit. Does project demonstrate technical merit?

- Is the technical approach based on sound scientific/engineering principles?
- Is the technical approach leading/progressing to a logical endpoint?
- Are technical results supporting the defined technical strategy and requirements?
- Are the technical results demonstrating technical feasibility?

Solution Viability. Is there a high probability that the results of the project can be delivered/implemented?

- Are safety, environmental, and health issues being addressed?
- Will the project likely produce results to meet the intended use?
- Can the results of the project be delivered in the timeframe required by site schedules for high-level waste disposition?
- Does the project offer technical advantages over the baseline or other alternatives?

High-Impact Cost/Risk Reduction or Avoidance. Within a larger U.S. Department of Energy, Office of Environmental Management (EM) project, will the current TFA project present high-impact cost/risk reduction or avoidance opportunities in the areas below, or will it support a key site decision?

- Cost Savings/Avoidance
- Technical Risk
- Programmatic Risk
- Environment, Safety and Health Risk
- Schedule Risk

In assessing cost/risk reduction or avoidance impact, within a larger EM project, assess as follows:

- High Impact (required to achieve high-impact cost/risk reduction or avoidance).
- Medium Impact (potentially required to achieve high-impact cost/risk reduction or avoidance).
- Low Impact (not required to achieve high-impact cost/risk reduction or avoidance).
- Uncertain

If a current TFA project supports high or medium cost/risk impacts, what specific task(s) supports this? What site-specific cost, risk, or decision area(s) is supported by the work?

If a current TFA project does not support high or medium cost/risk impacts, is there a value to continue the project through the end of fiscal year 2002? Is there a near-term data delivery, deployment, or completion opportunity?

Appendix E – Review Score Sheet

TFA FY 2002 Midyear Review -- Review Score Sheet - DRAFT

MYTR/Development Plan No:

Project Title:

Criteria	**Evaluation**					
1) Technical Merit. The project demonstrates technical merit.	Strongly Agree ☐	Agree ☐	Neutral ☐	Disagree ☐	Strongly Disagree ☐	Uncertain ☐

a. The technical approach is based on sound scientific/engineering principles.
b. The technical approach is leading/progressing to a logical endpoint.
c. The technical results support the defined technical strategy and requirements.
d. The technical results demonstrate technical feasibility.

2) Solution Viability. There is a high probability that the results of the project can be delivered/ implemented.	Strongly Agree ☐	Agree ☐	Neutral ☐	Disagree ☐	Strongly Disagree ☐	Uncertain ☐

a. Safety, environmental, and health issues are being addressed.
b. The project will likely produce results to meet the intended use.
c. The results of the project can be delivered in the timeframe required by site schedules for HLW disposition.
d. The project offers technical advantages over the baseline or other alternatives.

3) High-Impact Cost/Risk Reduction or Avoidance.	**Evaluation**
a. Does the project support one or more of the high risk/cost reduction opportunities identified by the Sites (see Review Guidance Background Information for descriptions of opportunities)? If yes, identify which one(s).	Yes ☐ / No ☐

Opportunity(ies):

INEEL
- ☐ SBW Disposition
- ☐ Calcine Disposition

Hanford, River Protection Project
- ☐ Alternative Tank Waste Processing
- ☐ Expand Capability of Waste Treatment Plant (WTP)
- ☐ SST Retrieval and Transfer
- ☐ Early Closure

SRS
- ☐ Accelerate Salt waste Retrieval, Processing, and Disposition
- ☐ Accelerate HLW Immobilization
- ☐ Accelerate Waste Retrieval and Tank and Equipment Disposition

If no, does it support other high risk/cost reduction opportunities or a key site decision? If yes, identify?	Yes / No ☐ ☐
Is there a cost/risk reduction or avoidance impact? If yes, identify the area(s) of impact and an assessment of the level of impact in that area. In assessing impact within a larger EM project, assess as follows: -- High Impact (**required** to achieve high-impact cost/risk reduction or avoidance). -- Medium Impact (**potentially** required to achieve high-impact cost/risk reduction or avoidance). -- Low Impact (**not** required to achieve high-impact cost/risk reduction or avoidance). -- Uncertain.	Yes / No ☐ ☐
	High Medium Low Uncertain
Cost Impact:	☐ ☐ ☐ ☐
	High Medium Low Uncertain
Technical Risk Impact:	☐ ☐ ☐ ☐
	High Medium Low Uncertain
Programmatic Risk Impact:	☐ ☐ ☐ ☐
	High Medium Low Uncertain
ES&H Risk Impact:	☐ ☐ ☐ ☐
	High Medium Low Uncertain
Schedule Risk Impact:	☐ ☐ ☐ ☐
If there is no cost/risk reduction impact, are there other impacts? If yes, identify.	Yes / No ☐ ☐
Project Closeout Impacts. If it is recommended that the project be closed out, are there impacts (e.g., outstanding project commitments that cannot be canceled without significant cost)? If yes, identify.	Yes / No ☐ ☐

Project Path Forward. Based on the evaluation above, in the opinion of the Review Team, should DOE continue to fund this project? Provide the rationale in a couple of sentences.	Yes / Maybe / No ☐ ☐ ☐
Comments (reference the criteria to which your comment(s) relates.)	

Appendix F – In-depth Review Criteria

F.1 In-depth Technical Reviews

The following project-specific criteria were developed for the two Tanks Focus Area (TFA) projects that underwent an in-depth technical review at TFA's fiscal year (FY) 2002 Midyear Review.

F.1.1 Review Criteria for B768, Melter Design Improvement– Melt Rate and Noble Metals Investigations

Principal Investigator

Doug Witt and Denny Bickford, Savannah River Technology Center (SRTC); S. K. Sundaram and Ron Goles, Pacific Northwest National Laboratory

Estimated Technical Maturity

Stage 4 – Advanced Development

Review Criteria

TFA is committed to tracking technical progress and maturity of technology development projects/tasks to ensure they are achieving technical and programmatic goals required to deliver technical solutions to user needs. Periodic technical progress and gate reviews are conducted to evaluate the ongoing work in the following areas:

1. Relevancy to User needs and requirements
2. Technical merit and maturity progression
3. Cost effectiveness of the proposed solution
4. Environment, safety and health (ES&H) risk evaluation and mitigation
5. Solution viability and delivery

In the context of the TFA FY 2002 Midyear Review, these five elements are addressed through the following review criteria:

1. Technical Merit. Does project demonstrate technical merit?
   - Is the technical approach based on sound scientific/engineering principles?
   - Is the technical approach leading/progressing to a logical endpoint?
   - Are technical results supporting the defined technical strategy and requirements?
   - Are the technical results demonstrating technical feasibility?

Suggested questions for consideration during review preparation and discussions:

- Is the technical project work based on well-founded assumptions and has a scientifically based, technically viable program been proposed?
  - If not, what assumptions should be reassessed?
  - What improvements could be suggested in the scientific/technical basis of the proposed work?
  - What are the potential significant technical gaps in the proposed approach?

- Does the proposed work consider relevant technical work in the scientific community and published literature?
  - If not, are there suggested source materials/experts the principal investigator(s) should access?

- Is the experimental program likely to provide adequate technical data to address technical uncertainties and provide sound recommendations?
  - If not, what additional experimentation or data requirements need to be added to strengthen the results?

- Have major decision points and a review strategy been adequately defined?
  - If not, are there specific recommendations on the approach for assessing the technical progress and feasibility of the work?

- What is your assessment of the current technical maturity of this work/technology? (see reference stage/gate definitions)

2. Solution Viability. Is there a high probability that the results of the project can be delivered/implemented?
   - Are safety, environmental, and health issues being addressed?
   - Will the project likely produce results to meet the intended use?
   - Can the results of the project be delivered in the timeframe required by site schedules for high-level waste (HLW) disposition?
   - Does the project offer technical advantages over the baseline or other alternatives?

Suggested questions for consideration during review preparation and discussions:

- Has the Principal Investigator/Technology Integration Manager (TIM) clearly articulated an understanding of the user need(s) that are being addressed by this project?

- Have end-user performance requirements been identified, documented, and incorporated into the technical strategy and project planning?

- Can the work defined in the technical strategy be completed in a timeframe consistent with the user need schedule?

- Is there evidence of site/user involvement in the definition and implementation of the technical strategy and/or project plan?

- Have appropriate and qualified performers been selected to conduct the program?
  - Are there specific recommendations on performer selection or makeup of the project team?
  - Has involvement of appropriate experts from industry, universities or national laboratories been considered in defining the technical approach?

- Have potential issues with intellectual property, proprietary information, or commercialization issues been considered? If they exist, has a plan to deal with these issues been defined?

- Is the budget for the proposed research reasonable to achieve the defined objectives?

3. High-Impact Cost/Risk Reduction or Avoidance. Within a larger U.S. Department of Energy, Office of Environmental Management (EM) project, will the current TFA project present high-impact cost/risk reduction or avoidance opportunities in the areas below, or will it support a key site decision?
   - Cost Savings/Avoidance
   - Technical Risk
   - Programmatic Risk
   - ES&H Risk
   - Schedule Risk

   In assessing cost/risk reduction or avoidance impact, within a larger EM project, assess as follows:
   - High Impact (**required** to achieve high-impact cost/risk reduction or avoidance).
   - Medium Impact (**potentially** required to achieve high-impact cost/risk reduction or avoidance).
   - Low Impact (**not** required to achieve high-impact cost/risk reduction or avoidance).
   - Uncertain.

   If a current TFA project supports high or medium cost/risk impacts, what specific task(s) supports this? What site-specific cost, risk, or decision area(s) is supported by the work?

   If a current TFA project does not support high or medium cost/risk impacts, is there a value to continue the project through the end of FY 2002? Is there a near-term data delivery, deployment, or completion opportunity?

Suggested questions for consideration during review preparation and discussions:

- Are there cost incentives to continue the research to address the site needs?

- Are there major ES&H risk factors that should be considered in the performance of the development program and in the implementation of the technical solution?
  - If so, what specific risks should be addressed in the planning and execution of the project?
  - Are these currently being adequately considered in the [project/task]?

Appendix G – In-depth Technical Review Reports

G.1 In-depth Technical Review Reports

G.1.1 B768, Melter Design Improvements

Tank Focus Area (TFA) Midyear Review, March 12, 2002, Session C, Salt Lake City, Utah

TFA Project – Melter Design Improvements – Melt Rate, Noble Metals Investigations (TFA B768)

Technical Maturity – Stage 4 – Advanced Development

Principal Investigators: D. C. Witt, D. Bickford, S. K. Sundaram, and R. Goles

Review Team:

J. A. Gentilucci, Technical Advisory Group (TAG), Lead
E. T. Weber, TAG
F. E. Woolley, TAG
B. R. Kowalski, TAG
P. Suggs, Savannah River Site (SRS)
R. Edwards, Westinghouse Savannah River Company (WSRC)
N. Machara, U.S. Department of Energy- (DOE-) Headquarters (HQ)

BACKGROUND/REVIEW OBJECTIVE, CRITERIA

Major cost savings associated with the vitrification process for high-level waste (HLW) are primarily related to two aspects: the time required to process the feed through the vitrification facility and the quantity of glass canisters produced that must be stored in the repository.

Either the time required to prepare the feed or the melt rate of the feed determines the vitrification process operating duration. An additional consideration is the life of the melter, which is determined by normal wear or other failure modes such as noble metals accumulation.

The waste loading that can be accommodated in the glass composition determines the quantity of glass canisters that will be sent to the repository. Cost reduction (i.e., reduced repository and reduced Defense Waste Processing Facility [DWPF] operating and capital costs) associated with increased waste loading is not part of this evaluation.

The primary objectives of the project reviewed are:

- Develop methods of increasing melt rate through modification of the feed composition (frit and waste washing)

- Development of small-scale techniques to evaluate feed composition impacts on the melt rate.
- Selection of promising formulations that perform qualitatively better than a baseline for further evaluation.
- Perform small-scale melter testing on a related slurry formulation to confirm expected operations.
- Develop a model for prediction of melt rate.
- Investigate the potential for melt rate increase using a bubbler.
- Determine component elements for a model that would predict the impact of noble metal accumulation.

The principal investigators presented the current status of the project at the TFA Midyear Review on March 11, 2002. The Review Team was also provided background information before the review to become familiar with the work performed. A list of this information is included in the references.

A set of review criteria (Appendix A) prepared by the TFA was used in evaluating this project. The consensus result of the review relative to these criteria is provided in Appendix B.

OBSERVATIONS/COMMENTS

Following is a summary of the observations and comments based on the presentation made at the TFA Midyear Review or by reports provided before the meeting. Additional commentary is provided in Appendix C.

Melt Rate Improvement

The overall program for achieving high and predictable processing rates has shown very good progress. The use of multiple scale tests to balance cost of testing against reliability of conclusions appears an efficient approach to down selection of candidate frits or process modifications. Crucible tests are poor indications of a continuous melting process and should be used primarily to screen for unwanted side effects. The dry melt rate furnace tests are fairly inexpensive and should be useful in roughly ranking various frits and other feed changes. The slurry fed melt rate furnace (SFMRF) is an excellent tool to approximate the conditions of a production melter in a small-scale laboratory furnace. Because of its limited size, its performance may be unduly influenced by phenomena such as bridging and thermal transients. Test methods used in combination are much more likely to give valid insights and conclusions than any test (short of full-scale tests in production melters) used alone. Melting rates derived from lab tests have large uncertainties, both absolutely and relatively. These uncertainties should be made clear whenever the test results are presented to avoid future loss of credibility as larger scale test results are obtained.

The selection of an alternate frit for the next DWPF process batch based on this program should demonstrate the applicability of this approach for improved melting. Because of the

compositional changes that occur with each sludge batch, a similar evaluation by the site will most likely be required for each new batch of sludge feed.

The use of a systems approach to this evaluation assured that other significant parameters were not violated.

Bubblers

The use of bubblers to improve melt rate has been known and demonstrated on small- scale units for a long time. The major problem has been implementation of the technology on a reliable basis (long material life) to a large-scale remote production unit. Efforts to provide an efficient reliable bubbler could produce significant advancement in DOE melter throughput capabilities. The addition of a bubbler to a melter system should also minimize erratic temperature fluctuations in the melter and thereby improve melter control. A bubbler may also impact the noble metal suspension and removal characteristics.

Noble Metals

Considerable noble metals research has been done in the past and will be incorporated as a part of the program. The ability to predict conditions that produce deposition and accumulation require a multi-component analysis of the competing conditions and reactions. Modeling should provide some basis for understanding the mechanisms that would most likely jeopardize the operation of a melter.

RECOMMENDATIONS

Following is a summary of the recommendations based on the presentation made at the TFA Midyear Review or by reports provided before the meeting. Additional commentary and suggested implementation methods are provided in Appendix C.

Melt Rate Improvement

The change in frit formulation to improve melt rate based on the melt rate furnace tests should be confirmed on the mini-melter and proceed to DWPF demonstration if no adverse effects are detected. Development of the SFMRF should continue to provide a better correlation between the melt/solids interface reactions and melt rate. The suite of tests developed during this program should all be used to minimize the cost of evaluating future changes to either frit composition or feed preparation. Since the goals overlap and the experimental methods are complimentary, a close tie should be developed between this program and the work by Dr. Hrma on project B7A1.

The potential for major cost reductions from this effort is sufficient justification for continuation in development of these tools and improving their application.

Bubblers

The development of a functional bubbler system is probably the most significant part of this program. The ability to improve melt characteristics is not always available through change in feed composition. The ability to affect the temperature transition zones by providing better heat transfer from internal agitation would be especially advantageous in these cases.

The lack of integration of this project with the work being done by Duratek and Catholic University greatly reduces the potential for applying benefits from this project to Hanford, as well as eliminating any benefits to the SRS from the DOE-funded Duratek and Catholic University programs. DOE should take the lead by reevaluating or modifying the Duratek agreement to make the information available to all the Sites.

Development of a functional bubbler should be a high priority activity.

Noble Metals

A thorough review of past noble metals modeling should be undertaken, including the assumptions. The use of a mathematical model of fluid flow to predict the effects of large conductive deposits on the melter bottom is excellent. However, there is some skepticism that unless the uncertainties in previous studies can be resolved, the models will be only qualitative in nature. Experiments should be conducted at as large a scale as possible to provide the best data. Verification of the model validity will be a difficult task.

REFERENCES

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Melter Rate Improvement for DWPF MB3:
Sugar Addition Test (U) J.E. Josephs, M.E. Stone

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Foaming Theory and Mitigation Techniques (U), D.K. Peeler, T.H. Lorier

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Melter Rate Improvement for DWPF MB3:
Frit Preparation (U), T.H. Lorier

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Melter Rate Improvement for DWPF MB3:
Frit Development and Model Assessment (U), D.K. Peeler, et al.

WSRC-TR-2001-00126, April, 2001
Melter Rate Improvement for DWPF MB3:
Feed Preparation, M.E. Stone, D. P. Lambert

WSRC-TR-2001-00148, Rev 0, May 8, 2001
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Summary and Recommendations (U), D.P. Lambert, T.H. Lorier, D.K. Peeler, M.E. Stone

APPENDIX A

TFA Fiscal Year (FY) 2002 Technical Review Criteria Worksheet

Project/Review Subject: B768 – Joule-Heated Melter Improvement Studies – Melt Rate and Noble Metals Investigations

Principal Investigator: Doug Witt and Denny Bickford, Savannah River Technology Center (SRTC); S. K. Sundaram and Ron Goles, Pacific Northwest National Laboratory (PNNL)

Estimated Technical Maturity: Stage 4 – Advanced Development

Background and Review Objective

Relevant site needs include SR01-2036 – Develop Improved HLW Melters, RL-WT-080 Advanced / Improved Vitrification, and RL-WT-100 – HLW / Low-Activity Waste (LAW) Melter Operation.

TFA work related to melt rate is structured to augment the existing site tasks to modify the feed and melter chemistry to improve melt rate. Small melt rate furnace tests, pilot melter tests, physical modeling work, and mathematical modeling are components of the TFA program. Since improvement of melt rate at SRS is such a significant issue in the current DWPF feed batch, the TFA effort will be closely integrated with the SRS Environmental Management (EM) -40 efforts. Melt rate tool development will continue with the goal of improving melt rate prediction capability and also toward establishing an improved understanding of parameters controlling melt rate. Melt rate furnace testing with both dry feed and slurry feeds will be used to investigate methods for improving melt rate. Redox and foaming issues and frit formulation will be major players in this effort. Pilot scale melters will be employed to scale up and demonstrate the small-scale melter tests (crucible and melt rate furnace) and investigate cold cap behavior and contribution to melt rate. Modeling will also be used in this task. Work will continue on improving the cold cap portion of a transient lumped parameter thermal model of the DWPF melter. In addition, a 3-D thermal fluids model of the DWPF melter will be used to evaluate potential benefits resulting the introduction of a bubbler. Physical modeling of the bubbler will accompany the use of the 3-D model. A planned activity for the out years is to introduce the 3-D thermal model into the transient lumped parameter thermal model. Melt rate furnace tests and mini-melter tests as well as modeling will be used to evaluate and improve melting rates for Idaho National Engineering and Environmental Laboratory (INEEL) feeds and will be closely integrated with the glass formulation task in B773. The SRS and INEEL work will be extended to Hanford needs as appropriate.

Accumulation of noble metals has been demonstrated to shorten the life of high-level waste glass melters in Europe. Recent analyses by West Valley Demonstration Project (WVDP) show significant reductions in melter power as a result of noble metals accumulation. This occurred at a time when WVDP was reducing throughput for other reasons and has not been widely recognized. The similarities between WVDP and SRS wastes elevate concerns for

DWPF and warrants evaluation. The DWPF melter was designed before the severity of the effect of noble metals shorting of melter electrodes was demonstrated at Pamela in Mol, Belgium. Although current operation is at a low noble metals concentration, the next feed batch will be substantially higher in noble metals. In the short term, data trends to monitor for melter degradation due to noble metal deposition are needed along with any corrective actions that can be implemented. In the longer term the melter design needs to be reevaluated based on the impact of the higher noble metals concentration. The Environmental Management Science Program spinel settling work at PNNL will be evaluated for applicability to this task. The approach developed here can be extended to INEEL and the DOE Office of River Protection (ORP) as appropriate.

Operating experience and data from the SRTC Integrated DWPF Melter System, the West Valley melter, and German experience will be used to estimate the impact of noble metals on DWPF operation. A 3-D thermal/electric field model of the DWPF melter will be employed to identify possible data trends indicative of noble metal accumulation. Large-scale melter tests using a noble metals surrogate are planned as an approach to verify and, perhaps, provide additional information on noble metals behavior. The development effort will also focus on evaluating ways to prevent or minimize the accumulation of noble metals. Identification of suitable surrogates for noble metals and preliminary modeling efforts are in progress at PNNL. This approach will be extended to INEEL and the River Protection Project as appropriate.

Review Criteria

TFA is committed to tracking technical progress and maturity of technology development projects/tasks to ensure they are achieving technical and programmatic goals required to deliver technical solutions to user needs. Periodic technical progress and gate reviews are conducted to evaluate the ongoing work in the following areas:

1. Relevancy to User needs and requirements
2. Technical merit and maturity progression
3. Cost effectiveness of the proposed solution
4. Environment, safety and health (ES&H) risk evaluation and mitigation
5. Solution viability and delivery

In the context of the TFA FY 2002 Midyear Review, these five elements are addressed through the following review criteria:

1. **Technical Merit.** Does project demonstrate technical merit?
   - Is the technical approach based on sound scientific/engineering principles?
   - Is the technical approach leading/progressing to a logical endpoint?
   - Are technical results supporting the defined technical strategy and requirements?
   - Are the technical results demonstrating technical feasibility?

Suggested questions for consideration during review preparation and discussions:

- Is the technical project work based on well-founded assumptions and has a scientifically based, technically viable program been proposed?
  - If not, what assumptions should be reassessed?
  - What improvements could be suggested in the scientific/technical basis of the proposed work?
  - What are the potential significant technical gaps in the proposed approach?

- Does the proposed work consider relevant technical work in the scientific community and published literature?
  - If not, are there suggested source materials/experts the principal investigator(s) should access?

- Is the experimental program likely to provide adequate technical data to address technical uncertainties and provide sound recommendations?
  - If not, what additional experimentation or data requirements need to be added to strengthen the results?

- Have major decision points and a review strategy been adequately defined?
  - If not, are there specific recommendations on the approach for assessing the technical progress and feasibility of the work?

- What is your assessment of the current technical maturity of this work/technology? (see reference stage/gate definitions)

2. **Solution Viability.** Is there a high probability that the results of the project can be delivered/implemented?
   - Are safety, environmental, and health issues being addressed?
   - Will the project likely produce results to meet the intended use?
   - Can the results of the project be delivered in the timeframe required by site schedules for HLW disposition?
   - Does the project offer technical advantages over the baseline or other alternatives?

Suggested questions for consideration during review preparation and discussions:

- Has the Principal Investigator/Technology Integration Manager (TIM) clearly articulated an understanding of the user need(s) that are being addressed by this project?

- Have end-user performance requirements been identified, documented, and incorporated into the technical strategy and project planning?

- Can the work defined in the technical strategy be completed in a timeframe consistent with the user need schedule?

- Is there evidence of site/user involvement in the definition and implementation of the technical strategy and/or project plan?

- Have appropriate and qualified performers been selected to conduct the program?
  - Are there specific recommendations on performer selection or makeup of the project team?
  - Has involvement of appropriate experts from industry, universities or national laboratories been considered in defining the technical approach?

- Have potential issues with intellectual property, proprietary information, or commercialization issues been considered? If they exist, has a plan to deal with these issues been defined?

- Is the budget for the proposed research reasonable to achieve the defined objectives?

3. **High-Impact Cost/Risk Reduction or Avoidance.** Within a larger EM project, will the current TFA project present high-impact cost/risk reduction or avoidance opportunities in the areas below, or will it support a key site decision?

   - Cost Savings/Avoidance
   - Technical Risk
   - Programmatic Risk
   - ES&H Risk
   - Schedule Risk

   In assessing cost/risk reduction or avoidance impact, within a larger EM project, assess as follows:

   - High Impact (required to achieve high-impact cost/risk reduction or avoidance).
   - Medium Impact (potentially required to achieve high-impact cost/risk reduction or avoidance).
   - Low Impact (not required to achieve high-impact cost/risk reduction or avoidance).
   - Uncertain.

   If a current TFA project supports high or medium cost/risk impacts, what specific task(s) supports this? What site-specific cost, risk, or decision area(s) is supported by the work?

   If a current TFA project does not support high or medium cost/risk impacts, is there a value to continue the project through the end of FY 2002? Is there a near-term data delivery, deployment, or completion opportunity?

Suggested questions for consideration during review preparation and discussions:

- Are there cost incentives to continue the research to address the site needs?

- Are there major ES&H risk factors that should be considered in the performance of the development program and in the implementation of the technical solution?

- If so, what specific risks should be addressed in the planning and execution of the project?
- Are these currently being adequately considered in the [project/task]?

- Are there significant interfaces with end-user programs and organizations responsible for ES&H reviews and analyses that should be considered?
  - If so, are the responsibilities and actions related to supporting these user-lead efforts defined and planned?

- Are there specific occupational safety risks that need to be considered both as it relates to the conduct of the experimental/development program and with respect to requirements for field implementation of the proposed technical solution?

APPENDIX B

TFA FY 2002 Midyear Review -- Consensus Review Team Score Sheet

MYTR/Development Plan No: B768

Project Title: Melter Design Improvements – Melt Rate and Noble Metals Investigations

Criteria	**Evaluation**					
1) Technical Merit. The project demonstrates technical merit.	Strongly Agree [X]	Agree [ ]	Neutral [ ]	Disagree [ ]	Strongly Disagree [ ]	Uncertain [ ]

a. The technical approach is based on sound scientific/engineering principles.
b. The technical approach is leading/progressing to a logical endpoint.
c. The technical results support the defined technical strategy and requirements.
d. The technical results demonstrate technical feasibility.

2) Solution Viability. There is a high probability that the results of the project can be delivered/implemented.	Strongly Agree [X]	Agree [ ]	Neutral [ ]	Disagree [ ]	Strongly Disagree [ ]	Uncertain [ ]

a. Safety, environmental, and health issues are being addressed.
b. The project will likely produce results to meet the intended use.
c. The results of the project can be delivered in the timeframe required by site schedules for HLW disposition.
d. The project offers technical advantages over the baseline or other alternatives.

3) High-Impact Cost/Risk Reduction or Avoidance.	**Evaluation**
a. Does the project support one or more of the high risk/cost reduction opportunities identified by the Sites (see Review Guidance Background Information for descriptions of opportunities)? If yes, identify which one(s).	Yes / No [X] [ ]

Opportunity(ies):

INEEL Project

[X] SBW Disposition

[X] Calcine Disposition

Hanford, River Protection

[ ] Alternative Tank Waste Processing

[X] Expand Capability of Waste Treatment Plant (WTP)

[ ] SST Retrieval and Transfer

[ ] Early Closure

SRS

[X] Accelerate Salt waste Retrieval, Processing, and Disposition

[X] Accelerate HLW Immobilization

[X] Accelerate Waste Retrieval and Tank and Equipment Disposition

If no, does it support other high risk/cost reduction opportunities or a key site decision? If yes, identify?	Yes / No ☐ ☐
Is there a cost/risk reduction or avoidance impact? If yes, identify the area(s) of impact and an assessment of the level of impact in that area. In assessing impact within a larger EM project, assess as follows: --High Impact (required to achieve high-impact cost/risk reduction or avoidance). --Medium Impact (potentially required to achieve high-impact cost/risk reduction or avoidance). --Low Impact (not required to achieve high-impact cost/risk reduction or avoidance). --Uncertain.	Yes / No ☒ ☐
Cost Impact:	High Medium Low Uncertain ☒ ☐ ☐ ☐
Technical Risk Impact:	High Medium Low Uncertain ☐ ☒ ☐ ☐
Programmatic Risk Impact:	High Medium Low Uncertain ☐ ☒ ☐ ☐
ES&H Risk Impact:	High Medium Low Uncertain ☐ ☐ ☒ ☐
Schedule Risk Impact:	High Medium Low Uncertain ☐ ☒ ☐ ☐
If there is no cost/risk reduction impact, are there other impacts? If yes, identify.	Yes / No ☐ ☐
Project Closeout Impacts. If it is recommended that the project be closed out, are there impacts (e.g., outstanding project commitments that cannot be canceled without significant cost)? If yes, identify.	Yes / No ☐ ☒
Project Path Forward. Based on the evaluation above, in the opinion of the Review Team, should DOE continue to fund this project? Provide the rationale in a couple of sentences.	Yes / Maybe / No ☒ ☐ ☐

Comments (reference the criteria to which your comment(s) relates.)

Work on tailoring frit to maximize melt rate using small scale indicates techniques which should be applicable to future down selection work. Small scale testing should tell if any major uncertainties arise before full scale work in DWPF. DWPF frit change has essentially no risk. Applicability to Hanford is uncertain and needs review. Applicability of bubbler design to DWPF is uncertain.

APPENDIX C

ADDITIONAL CONSIDERATIONS

1. MELT RATE

The apparent differences in melt rate which show in the data from melt-rate furnace testing may or may not hold up when these feeds are run at larger scale in slurry fed melter systems. It is somewhat intuitive that frits with higher alkali content should show higher melting rates when mixed with the sludge. However, it is puzzling that the measured viscosity of the melts does not track with the melt rate hierarchy. Glass made with Frit 304, which had the highest melt rate, had higher measured viscosity. Perhaps viscosity differences, which are expected to affect heat transfer efficiency between the melt bath and cold cap in large melters, are not a factor at the scale of testing in the melt-rate furnace.

SRTC staff should continue to work closely with Dr. Pavel Hrma in relation to his task on melt rate evaluation. The ideal approach would be for Hrma to run detailed testing on several of the SRS frit/sludge combinations (more than just the two compositions with Frit 200 and Frit 320 provided by SRTC so far). Hrma's approach and work have the best chance of developing a mechanistic understanding of the differences between frits which show in the SRTC melt-rate tests.

SRTC staff are recommending that frit compositions be tested and that frit be optimized for each new sludge batch. If the results on melt rate enhancement from the dry feed melt-rate furnace testing are validated by larger scale testing and production experience, the effort to optimize frit for each macro-batch should have a significant pay off in reduced operating costs for DWPF over the life of the mission. Any needed tuning of the property models should be supported.

The methodology used by SRTC to screen frit candidates based on quick crucible tests and the melt-rate furnace seems to be an effective approach to testing melter feed compositions. It will be important to obtain the slurry feed testing data, as planned, for a comparison of melt rates between feed using Frit 200 and feed using Frit 320. It was not clear how much slurry fed testing will be done in the mini-melter and in the larger slurry fed melt-rate furnace. A well thought out testing program using the slurry fed melting systems should be defined. Obtaining a comparison test between just two of the frits considered in the initial melt-rate testing series does not seem sufficient to validate the dry feed melt-rate test. It is important to consider the overall performance requirements. The systems approach used in this program assures that other significant parameters were not violated.

Several directions look promising for future melt rate tests. The emphasis on controlling foaming under the cold cap seems correct. The present concept of tailoring liquid phase properties to the temperature ranges of rapid gas generation is excellent. A method of estimating the volume fraction of liquid is needed, since that parameter is as important as the viscosity of the liquid phase.

One approach to foam avoidance is keeping both the liquid phase viscosity and volume fraction low as long into the heat-up of feed as possible. This suggests trying to tie up those components that increase melt viscosity in an inert solid phase. Potential methods include:

- Combine a low silica frit with coarse sand. Sand should have a narrow particle size distribution (PSD) and should be as coarse as possible without causing settling, sampling or slurry handling problems.
- Combine a low alkali, high viscosity frit with alkali salts that would lower the viscosity of the liquid phase that forms initially. The salts should produce no gases (e.g. anhydrous sodium borate) or produce gases at low temperatures (e.g. nitrates, formates, and borates).
- Eliminate frit fines. The frit PSD should be as narrow as practical, and as coarse as allowed by slurry settling considerations.

The other way to control foaming is to reduce the amount of gas released at high temperatures, after a large volume fraction of liquid phase has been formed. The gases released last are usually oxygen from redox reactions, and sulfur dioxide from decomposition of sulfates in the feed. Both can be addressed by addition of reducing agents to the feed. To suppress generation of both oxygen and sulfur dioxide from the melt at high temperatures, the reducing agents need to react at relatively high temperatures. Formates, oxalates and other easily decomposed reductants tend to react at low temperatures, while graphite, powdered metals and organics that tend to carbonize at low temperatures (e.g. sugar, starch) remain available at high temperatures when they are most needed. This suggests trying:

- Graphite additions, a fairly narrow PSD, and coarse enough to survive to a high temperature.
- Small amounts of powdered metals that form stable high temperature oxides (e.g. titanium), coarse enough to avoid premature oxidation.

2. BUBBLERS

This is probably the most important part of the program, because it has the largest potential to both increase melt rate and to make the melt rate less sensitive to changes in feed composition and preparation. A good math model of fluid flow is the key tool in scaling up the effect of bubblers from pilot tests. Because of difficulty of scale-up, a serious effort should be made to reduce perceived risks and push for early trials in DWPF

Bubbler development should focus on moving the maximum volume of glass first, then deal with materials issues as they arise. Physical modeling at the correct kinematic viscosity could be used to rank designs.

When effective pumping of glass has been demonstrated, material lifetime issues can be addressed by increasing thickness in critical spots without sacrificing pumping rate. If lifetime turns out to be a serious problem, a simple tube configuration (rather than a tube in tube) design should be considered even though the pumping efficiency will be lower.

The bubbling gas should be chosen for its influence on the melt oxidation state. Use of air may allow more reducing conditions in the cold cap (through addition of more

reductants in the feed) while keeping the melt more oxidizing to avoid spinel formation. Use of nitrogen or argon would be expected to make the melt more reducing and may lead to bubbler corrosion by alloying with metals reduced from the melt.

DOE should take the lead in developing and negotiating a collaborative effort between SRTC and Duratek/Catholic University to further develop and optimize bubblers for use in DOE HLW melters. The larger scale pilot melters in the CUA facilities might provide a readily available test bed for the SRTC bubbler design, in which existing data on performance of the Duratek bubbler designs could be compared to the SRTC design.

3. NOBLE METALS

Precipitation of noble metals is probably the most difficult phenomenon to correctly reproduce in either lab tests or math models. Experiments should be conducted at as large a scale as possible and the results viewed with great skepticism. The choice of frit should be expected to have a significant influence on noble metals precipitation in the cold cap.

Plans to use a math model of fluid flow to predict the effects of large conductive deposits on the melter bottom are excellent. Model improvements may be needed to correctly predict the effect of bubblers on noble metals deposition.

SRTC and the supporting (contracted) university staff should obtain the documentation and the code input details from the PNNL and SRTC modeling work done in the 1991-1994 period. This base should be critically evaluated, especially as to the electrical properties and spatial configurations assigned to the noble metals deposits in the modeling. The most effective use of additional modeling would appear to be to evaluate whether any of the uncertainties present in the previous model predictions of noble metals effects on melter lifetime can be reduced by further modeling.

G.1.2 B923, Enhanced Grout Formulations for Tank Closure

Tank Focus Area (TFA) Midyear Review, March 12, 2002, Session C, Salt Lake City, Utah

TFA Project: Enhanced Grout Formulations for Tank Closure (TFA B923)

Principal Investigators: Christine Langton, SRTC; Roger Spence, Oak Ridge National Laboratory (ORNL).

Review Team[a]

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BACKGROUND AND REVIEW OBJECTIVES

The TFA Midyear Review presentation for this project was given by Christine Langton, on Tuesday, March 12, 2002, in Salt Lake City, Utah. Co-Principal Investigator Roger Spence did not attend. A document entitled "TFA FY 2002 Technical Review Criteria Worksheet" (Appendix A) was prepared and given to the Review Team beforehand. This document contains a summary of both the needs and the technical approach used by the principal investigators. It also contains a suggested outline of the review process to be used by the review team. For brevity, that material will not be repeated here. Accompanying the document was a Review Score Sheet (Appendix B) for documenting consensus results of the Review Team.

The focus of the Review Team during the presentation was to ascertain (1) whether the project presents high-impact cost/risk reduction or avoidance opportunities, or (2) whether the project supports key site decisions.

OBSERVATIONS AND GENERAL RECOMMENDATIONS

Five objectives for the project were discussed during the presentation.[b] They are:

1) Identify site needs for grout and assemble current knowledge in the grout field.
2) Test several baseline grout formulations.

(a) One additional person submitted an unsigned review of the project.
(b) These objectives do not correspond exactly with the tasks identified in the B923 development plan, but cover the same scope of work and are taken from the Technical Approach given in the TFA FY 2002 Technical Review Criteria Worksheet.

3) Identify and test modifications to grout formulations for enhancing performance with alkaline or acidic tank residuals.
4) Perform field tests to verify pumpability and final placement of enhanced grouts.
5) Obtain information, through collaboration, on relevant Russian experience with grouts that retain key contaminants such as technetium-99 (Tc-99).

It was clear from the presentation that the principal investigator has a very good command of the subject, as she described the progress being made on each of the listed tasks. It is also clear from tank closure experience in the United States that grouting tanks will be a major factor in radiologically, and possibly structurally, securing the tanks and the residual wastes contained therein over an extended period of time. There is no viable alternative to grouting these tanks, so this project, if done well, will have a major impact on the entire nuclear waste disposal program. It appears that this work is being done very well.

Because the tanks are distributed among a number of sites, the grout performance knowledge produced by this work will support key site decisions in a major way. Well-defined grout behavior will allow regulation of tank closure to proceed more efficiently and with more assurance, due to the reduction of uncertainty in performance.

Grouting can have application to tanks containing varying amounts of either HLW or LAW, and should be considered for either application. Improved grout capabilities could allow for safe in-situ disposal of relatively large amounts of tank waste (less retrieval) thereby reducing waste processing costs, or stabilization of small amounts of tank residuals and the tank structure.

The review committee was told this work will be documented in a series of letter reports, journal publications, and possibly other reports that focus on specific tasks. It is unclear whether a comprehensive report on the work will be generated. If not, the committee recommends strongly that such a comprehensive report covering the entire project be written. Grouting of tanks is an integral part of tank closure and the existence of such a report will allow all participants in the process to efficiently focus their efforts on tank closure. It is important that meaningful peer reviews be obtained on the reports, journal publications, etc. generated under this project to enhance credibility.

SPECIFIC COMMENTS AND RECOMMENDATIONS

1) **Identify site needs for grout and assemble current knowledge in the grout field**.

This part of the program should lead to the creation of a "Handbook" of grout alternatives, which could be used by the sites to formulate the grout most applicable to each site's unique ground environment. If the timetable for tank closure is accelerated, this knowledge of grout capabilities will allow for the efficient determination and use of site-specific grouts. This task was completed in FY 2001.

No document was distributed at the meeting containing the results of the survey of site needs. It is recommended that this survey be documented and distributed to the sites for their use.

This output will satisfy a long-standing need to pull together diverse grout information for HLW containment.

2) **Test several baseline grout formulations**.

Baseline grout formulations from WVDP and SRS are being prepared for testing at ORNL and SRS. This will provide baseline data on properties and performance, allowing detailed comparison of two grout formulations which will have large scale application at the sites.

3) **Identify and test modifications to grout formulations for enhancing performance with alkaline or acidic tank residuals**.

Modified grout formulations for enhancing grout performance will be prepared and tested. Both tasks 2 and 3 will be completed by end of FY 2002. Publication of these results will follow the testing. Grout retention, displacement, and mixing with radiological residues in the tanks will be measured and documented.

The grout formulations appear to be robust, covering most conditions found at the sites. The studies include evaluation of some special additives for radionuclide stabilization, as well as determination of the stabilization effectiveness of key components. It is not clear how extensive these studies are in the currently funded work scope. Consideration should be given to an expanded follow-on program to continue exploration of special additives and to address mechanistic understanding of long-term performance of the grouts. Specifically, Hanford site grout requirements should be considered.

This work on grout performance should be extended to include Resource Conservation and Recovery Act (RCRA) constituents of interest to the sites.

Benign tracers should be considered as an additive to the grouts being tested. This could provide information on the extent of any future leakage after tank closure.

Although the grout formulations being designed and tested may not have universal applicability to all sites, minor modifications to these formulations should allow for their use at any given site. The tools being developed for prediction of properties covering a range of generic formulations are a key feature of this work. Nevertheless, some degree of testing of specific formulation modifications applicable to unique situations should be expected by the ultimate user.

4) **Perform field tests to verify pumpability and final placement of enhanced grouts**.

These field tests appear to be a reasonable and necessary confirmation that recommended generic grout formulations perform as expected. However, it appears that leach testing will be done only on laboratory samples made from the mixes. The benefit to performance confirmation of leach testing of core samples from the engineering scale monoliths should be given further consideration.

5) **Obtain information, through collaboration, on relevant Russian experience with grouts that retain key contaminants such as Tc-99**.

A letter report on Russian experience will be written, and a journal article will be prepared by the two groups.

The Russian experience may be very valuable to our waste management program. It is unclear whether enough effort is being extended on this part of the project to obtain and adequately document that Russian experience.

APPENDIX A

TFA FY 2002 Technical Review Criteria Worksheet

Project/Review Subject: B923 – Grout Formulations for Tank Closure

Principal Investigator: Christine Langton, SRTC; Roger Spence, ORNL

Estimated Technical Maturity: Stage 3 – Exploratory Development

Background and Review Objective

Summary of Need(s):

OH-WV-914 - Development of Grout for In-Situ Closure. West Valley is developing an enhanced grout that includes reducing agents and sorbents for capturing and/or binding mobile radiological and chemical contaminants. The grout would serve to stabilize residual tank waste in-place in its tanks. It is being designed to be pourable / pumpable, to possess structural strength, and to be readily excavated in the event that an alternative method of tank closure is developed. West Valley is asking the Tank Focus Area to determine the radionuclide and chemical performance (with uncertainties) of the enhanced grout. They desire sorption/desorption Kd measurements for key radionuclides and toxicity characteristic leaching procedure (TCLP) data for RCRA metals.

ID-2.1.46 and ID-2.1.47 – Management of Tank Heel Liquids and Solids. Idaho notes that liquid and solid heels will remain in tanks WM-182 and WM-183, which are scheduled to be closed by 2004. Idaho plans on pouring grout into the tanks in a manner that pushes the heels towards the tank transfer jet, so as to maximize the amount of heel that is jetted from the tank. Idaho assumes that the grout will neutralize the liquid heels at the solid/liquid interface so that the integrity of the grout is not compromised. Idaho requests additional tank closure and grout development studies to demonstrate that the liquid and solid heels can be managed as planned and to show that the tank waste does not compromise the grout integrity.

SR01-2051 – Technology to Mitigate Effects of Technetium under Tank Closure Conditions. Savannah River has used reducing grout to close its first two tanks and plans to continue this practice for future tank closures. The main function of the reducing grout is to reduce the mobility of Tc-99 (Savannah River's predominant risk contributor), which is much less mobile under reducing than oxidizing conditions. Currently, SRS assumes that the reducing zone is only the waste layer (a few inches). The Tc-99 is assumed to encounter an oxidizing zone and become highly mobile as soon as it leaves the waste layer. SRS considers its current practice to be highly conservative, because the water leaving the waste layer should be reducing for some distance. SRS wants to know if reducing grout impacts Tc-99 movement immediately below the reducing grout layer.

Technical Approach:

The TFA utilized a competitive selection process to select a performer team to meet the sites' needs. Principal Investigators are Christine Langton from WSRC and Roger Spence from University of Tennessee – Battelle (ORNL). The selected team is contracting to obtain Russian support for its effort.

To support tank/site-specific, performance requirements for tank closure materials, this project will develop an improved science understanding of grout chemistry. This will allow sites to quickly focus on the key grout formulations that will meet their needs. It will also generate a repository of grout formulation information that has begun to be developed over the last few years as the sites have started to deal with tank closure. Several tasks will be utilized.

This project will document the current DOE tank site state-of-the-art for grouting tanks, will do comparison testing of several grout formulations currently used by sites, will identify and test the effectiveness of grout formulation enhancements both in the laboratory and through preliminary field tests, and will access Russian grout chemistry knowledge and expertise.

Specifically, the principal investigators will discuss tank-closure grout-performance needs and historical practices with West Valley, Idaho, Savannah River, Oak Ridge, and Hanford personnel. Based on these discussions, the technical knowledge of the principal investigators, literature searches, and discussions with other grout experts, the principal investigators will jointly prepare a letter report discussing key issues and the current state-of-the-art for grouting tanks.

Second, the principal investigators will do comparison testing of several current grout formulations to develop baseline information on grout performance. Radionuclide Kd and RCRA contaminant TCLP data will be obtained for surrogate waste mixed with the West Valley grout formulation and a SRS reducing grout formulation.

Third, the principal investigators will identify potential approaches for providing enhanced grout performance for tank closures. A selection of laboratory tests will be performed to determine the effect and importance of the proposed approaches. Possibilities include modifying basic grout components (cement, fly ash, clay) reducing agents, set inhibitors, and sorbents. The test program should provide information relevant to enhanced in-tank grouts for stabilizing both alkaline and acidic tank residuals

Fourth, the principal investigators will do a few 5-20 cubic yard field trials to verify placement and pumpability issues for the enhanced grouts.

Fifth, the principal investigators will utilize Russian grout chemistry knowledge and expertise. The Russian grout experts will be asked to summarize their grouting approaches for waste treatment. They will also be asked to do thermodynamic and kinetic studies for hydrated silicate chemistry so that a better understanding of long-term redox potential performance is obtained for key contaminates such as technetium. An improved

understanding of Tc-99 mobility immediately below a reducing grout waste layer will also be provided.

Review Criteria

TFA is committed to tracking technical progress and maturity of technology development projects/tasks to ensure they are achieving technical and programmatic goals required to deliver technical solutions to user needs. Periodic technical progress and gate reviews are conducted to evaluate the ongoing work in the following areas:

1. Relevancy to User needs and requirements
2. Technical merit and maturity progression
3. Cost effectiveness of the proposed solution
4. ES&H risk evaluation and mitigation
5. Solution viability and delivery

In the context of the TFA FY 2002 Midyear Review, these five elements are addressed through the following review criteria:

1. Technical Merit. Does project demonstrate technical merit?
   - Is the technical approach based on sound scientific/engineering principles?
   - Is the technical approach leading/progressing to a logical endpoint?
   - Are technical results supporting the defined technical strategy and requirements?
   - Are the technical results demonstrating technical feasibility?

Suggested questions for consideration during review preparation and discussions:

- Is the technical project work based on well-founded assumptions and has a scientifically based, technically viable program been proposed?
  - If not, what assumptions should be reassessed?
  - What improvements could be suggested in the scientific/technical basis of the proposed work?
  - What are the potential significant technical gaps in the proposed approach?

- Does the proposed work consider relevant technical work in the scientific community and published literature?
  - If not, are there suggested source materials/experts the principal investigator(s) should access?

- Is the experimental program likely to provide adequate technical data to address technical uncertainties and provide sound recommendations?
  - If not, what additional experimentation or data requirements need to be added to strengthen the results?

- Have major decision points and a review strategy been adequately defined?
  - If not, are there specific recommendations on the approach for assessing the technical progress and feasibility of the work?

- What is your assessment of the current technical maturity of this work/technology? (see reference stage/gate definitions)

2. Solution Viability**.** Is there a high probability that the results of the project can be delivered/implemented?
   - Are safety, environmental, and health issues being addressed?
   - Will the project likely produce results to meet the intended use?
   - Can the results of the project be delivered in the timeframe required by site schedules for HLW disposition?
   - Does the project offer technical advantages over the baseline or other alternatives?

Suggested questions for consideration during review preparation and discussions:

- Has the Principal Investigator/TIM clearly articulated an understanding of the user need(s) that are being addressed by this project?

- Have end-user performance requirements been identified, documented, and incorporated into the technical strategy and project planning?

- Can the work defined in the technical strategy be completed in a timeframe consistent with the user need schedule?

- Is there evidence of site/user involvement in the definition and implementation of the technical strategy and/or project plan?

- Have appropriate and qualified performers been selected to conduct the program?
  - Are there specific recommendations on performer selection or makeup of the project team?
  - Has involvement of appropriate experts from industry, universities or national laboratories been considered in defining the technical approach?

- Have potential issues with intellectual property, proprietary information, or commercialization issues been considered? If they exist, has a plan to deal with these issues been defined?

- Is the budget for the proposed research reasonable to achieve the defined objectives?

3. High-Impact Cost/Risk Reduction or Avoidance**.** Within a larger EM project, will the current TFA project present high-impact cost/risk reduction or avoidance opportunities in the areas below, or will it support a key site decision?
   - Cost Savings/Avoidance
   - Technical Risk

- Programmatic Risk
- ES&H Risk
- Schedule Risk

In assessing cost/risk reduction or avoidance impact, within a larger EM project, assess as follows:

- High Impact (required to achieve high-impact cost/risk reduction or avoidance).
- Medium Impact (potentially required to achieve high-impact cost/risk reduction or avoidance).
- Low Impact (not required to achieve high-impact cost/risk reduction or avoidance).
- Uncertain.

If a current TFA project supports high or medium cost/risk impacts, what specific task(s) supports this? What site-specific cost, risk, or decision area(s) is supported by the work?

If a current TFA project does not support high or medium cost/risk impacts, is there a value to continue the project through the end of FY 2002? Is there a near-term data delivery, deployment, or completion opportunity?

Suggested questions for consideration during review preparation and discussions:

- Are there cost incentives to continue the research to address the site needs?

- Are there major ES&H risk factors that should be considered in the performance of the development program and in the implementation of the technical solution?
  - If so, what specific risks should be addressed in the planning and execution of the project?
  - Are these currently being adequately considered in the [project/task]?

- Are there significant interfaces with end-user programs and organizations responsible for ES&H reviews and analyses that should be considered?
  - If so, are the responsibilities and actions related to supporting these user-lead efforts defined and planned?

- Are there specific occupational safety risks that need to be considered both as it relates to the conduct of the experimental/development program and with respect to requirements for field implementation of the proposed technical solution?

APPENDIX B

TFA FY 2002 Midyear Review – Review Team Consensus Score Sheet

MYTR/Development Plan No: B923
Project Title: Enhanced Grout Formulations for Tank Closure

Criteria	Evaluation					
1) **Technical Merit.** The project demonstrates technical merit.	Strongly Agree ☒	Agree ☐	Neutral ☐	Disagree ☐	Strongly Disagree ☐	Uncertain ☐
e. The technical approach is based on sound scientific/engineering principles. f. The technical approach is leading/progressing to a logical endpoint. g. The technical results support the defined technical strategy and requirements. h. The technical results demonstrate technical feasibility.						
2) **Solution Viability.** There is a high probability that the results of the project can be delivered/implemented.	Strongly Agree ☒	Agree ☐	Neutral ☐	Disagree ☐	Strongly Disagree ☐	Uncertain ☐
e. Safety, environmental, and health issues are being addressed. f. The project will likely produce results to meet the intended use. g. The results of the project can be delivered in the timeframe required by site schedules for HLW disposition. h. The project offers technical advantages over the baseline or other alternatives.						

3) High-Impact Cost/Risk Reduction or Avoidance.	Evaluation
b. Does the project support one or more of the high risk/cost reduction opportunities identified by the Sites (see Review Guidance Background Information for descriptions of opportunities)? If yes, identify which one(s).	Yes / No [X] [ ]
Opportunity(ies): **INEEL** [X] SBW Disposition [ ] Calcine Disposition **Hanford, River Protection Project** [ ] Alternative Tank Waste Processing [ ] Expand Capability of Waste Treatment Plant (WTP) [ ] SST Retrieval and Transfer [X] Early Closure **SRS** [ ] Accelerate Salt waste Retrieval, Processing, and Disposition [ ] Accelerate HLW Immobilization [X] Accelerate Waste Retrieval and Tank and Equipment Disposition	
If no, does it support other high risk/cost reduction opportunities or a key site decision? If yes, identify?	Yes / No [X] [ ]
Is there a cost/risk reduction or avoidance impact? If yes, identify the area(s) of impact and an assessment of the level of impact in that area. In assessing impact within a larger EM project, assess as follows: --High Impact (required to achieve high-impact cost/risk reduction or avoidance). --Medium Impact (potentially required to achieve high-impact cost/risk reduction or avoidance). --Low Impact (not required to achieve high-impact cost/risk reduction or avoidance). --Uncertain.	Yes / No [X] [ ]
Cost Impact:	High Medium Low Uncertain [X] [ ] [ ] [ ]
Technical Risk Impact:	High Medium Low Uncertain [ ] [X] [ ] [ ]
Programmatic Risk Impact:	High Medium Low Uncertain [ ] [X] [ ] [ ]
ES&H Risk Impact:	High Medium Low Uncertain [ ] [X] [ ] [ ]
Schedule Risk Impact:	High Medium Low Uncertain [ ] [X] [ ] [ ]

If there is no cost/risk reduction impact, are there other impacts? If yes, identify.	Yes / No ☐ ☒
Project Closeout Impacts. If it is recommended that the project be closed out, are there impacts (e.g., outstanding project commitments that cannot be canceled without significant cost)? If yes, identify.	Yes / No ☒ ☐
Project Path Forward. Based on the evaluation above, in the opinion of the Review Team, should DOE continue to fund this project? Provide the rationale in a couple of sentences.	Yes / Maybe / No ☒ ☐ ☐

Comments (reference the criteria to which your comment(s) relates.)

1. Technical Merit
   Work will create "handbook" of grout alternatives.

   Russian experience documentation will provide added insight.

   Will have wide applicability to tank closure.

2. Solution Viability
   Project should interact with Hanford to provide most recent assumptions/requirements on closure and LAW immobilization options and tentative requirements.

3. High Impact
   Acceleration of tank closure will increase demand for grout performance information for planning, performance assessments, and implementation leading to closure.

   Excellent staff capabilities should be applied to site-specific needs, including LAW processing.

4. Closeout Impacts
   Will waste tremendous opportunity of providing strong basis for major acceleration/cost reduction projects at Hanford/

   Stopping work now will just defer it to a later time, with possible loss of expertise now extant.

   If stopped some Russian work would continue into FY-03.

5. General Comments
   Satisfies long-standing need to pull together grout information for HLW in documented form.

   Excellent P.I. group

   Work should be extended to RCRA constituents of interest at specific sites.

   Benign tracers should be considered as an additive to grouts for future leakage indicators from closed facilities.

   Grout behavior, as it becomes more well defined, will help with regulator interaction and scoping studies to reach desirable properties for closed tanks.

   It has potential use in closure of buildings and tanks that are not necessarily HLW facilites.

It may support decision for in-place closure of tanks at WVDP, but WVDP would probably perform work anyway.

May be applicable to LAW retention.

Work completed to date should provide basis for site-specific further work.

"High Impact" may depend on extent of use for in-situ closure and for use on post pre-treatment streams.

Near term use will enable early closure.

Need better initial insertion points into programs.

Product of work isn't well defined.

Capabilities of grout could lead to safe disposal of high inventories in tank (no retrieval) → reduced process costs.

Unclear how grout performance factors into overall disposal system (strategy).

Grout is one barrier of several between source and environment. Analysis should include entire system.

More effective grouts will allow for more HLW or LAW to remain in tank.

Grout structural integrity should be considered in closure performance.

Should fund under core technologies grout work includes SCFA and TNFA problems.

More coordination/collaboration is needed.

- Are there significant interfaces with end-user programs and organizations responsible for ES&H reviews and analyses that should be considered?
  - If so, are the responsibilities and actions related to supporting these user-lead efforts defined and planned?

- Are there specific occupational safety risks that need to be considered both as it relates to the conduct of the experimental/development program and with respect to requirements for field implementation of the proposed technical solution?

F.1.2 Review Criteria for B923, Enhanced Grout Formulations for Tank Closure

Principal Investigators

Christine Langton, SRTC; Roger Spence, Oak Ridge National Laboratory

Estimated Technical Maturity

Stage 3 – Exploratory Development

Review Criteria

TFA is committed to tracking technical progress and maturity of technology development projects/tasks to ensure they are achieving technical and programmatic goals required to deliver technical solutions to user needs. Periodic technical progress and gate reviews are conducted to evaluate the ongoing work in the following areas:

1. Relevancy to user needs and requirements
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In the context of the TFA FY 2002 Midyear Review, these five elements are addressed through the following review criteria:

1. Technical Merit. Does project demonstrate technical merit?
   - Is the technical approach based on sound scientific/engineering principles?
   - Is the technical approach leading/progressing to a logical endpoint?
   - Are technical results supporting the defined technical strategy and requirements?
   - Are the technical results demonstrating technical feasibility?

Suggested questions for consideration during review preparation and discussions:

- Is the technical project work based on well-founded assumptions and has a scientifically based, technically viable program been proposed?

- If not, what assumptions should be reassessed?
- What improvements could be suggested in the scientific/technical basis of the proposed work?
- What are the potential significant technical gaps in the proposed approach?

- Does the proposed work consider relevant technical work in the scientific community and published literature?
  - If not, are there suggested source materials/experts the principal investigator(s) should access?

- Is the experimental program likely to provide adequate technical data to address technical uncertainties and provide sound recommendations?
  - If not, what additional experimentation or data requirements need to be added to strengthen the results?

- Have major decision points and a review strategy been adequately defined?
  - If not, are there specific recommendations on the approach for assessing the technical progress and feasibility of the work?

- What is your assessment of the current technical maturity of this work/technology? (see reference stage/gate definitions)

2. Solution Viability. Is there a high probability that the results of the project can be delivered/implemented?
   - Are safety, environmental, and health issues being addressed?
   - Will the project likely produce results to meet the intended use?
   - Can the results of the project be delivered in the timeframe required by site schedules for HLW disposition?
   - Does the project offer technical advantages over the baseline or other alternatives?

Suggested questions for consideration during review preparation and discussions:

- Has the Principal Investigator/TIM clearly articulated an understanding of the user need(s) that are being addressed by this project?

- Have end-user performance requirements been identified, documented, and incorporated into the technical strategy and project planning?

- Can the work defined in the technical strategy be completed in a timeframe consistent with the user need schedule?

- Is there evidence of site/user involvement in the definition and implementation of the technical strategy and/or project plan?

- Have appropriate and qualified performers been selected to conduct the program?
  - Are there specific recommendations on performer selection or makeup of the project team?
  - Has involvement of appropriate experts from industry, universities or national laboratories been considered in defining the technical approach?

- Have potential issues with intellectual property, proprietary information, or commercialization issues been considered? If they exist, has a plan to deal with these issues been defined?

- Is the budget for the proposed research reasonable to achieve the defined objectives?

3. High-Impact Cost/Risk Reduction or Avoidance. Within a larger EM project, will the current TFA project present high-impact cost/risk reduction or avoidance opportunities in the areas below, or will it support a key site decision?
   - Cost Savings/Avoidance
   - Technical Risk
   - Programmatic Risk
   - ES&H Risk
   - Schedule Risk

   In assessing cost/risk reduction or avoidance impact, within a larger EM project, assess as follows:

   - High Impact (**required** to achieve high-impact cost/risk reduction or avoidance).
   - Medium Impact (**potentially** required to achieve high-impact cost/risk reduction or avoidance).
   - Low Impact (**not** required to achieve high-impact cost/risk reduction or avoidance).
   - Uncertain.

   If a current TFA project supports high or medium cost/risk impacts, what specific task(s) supports this? What site-specific cost, risk, or decision area(s) is supported by the work?

   If a current TFA project does not support high or medium cost/risk impacts, is there a value to continue the project through the end of FY 2002? Is there a near-term data delivery, deployment, or completion opportunity?

Suggested questions for consideration during review preparation and discussions:

- Are there cost incentives to continue the research to address the site needs?

- Are there major ES&H risk factors that should be considered in the performance of the development program and in the implementation of the technical solution?
  - If so, what specific risks should be addressed in the planning and execution of the project?
  - Are these currently being adequately considered in the [project/task]?

- Are there significant interfaces with end-user programs and organizations responsible for ES&H reviews and analyses that should be considered?
  - If so, are the responsibilities and actions related to supporting these user-lead efforts defined and planned?

- Are there specific occupational safety risks that need to be considered both as it relates to the conduct of the experimental/development program and with respect to requirements for field implementation of the proposed technical solution?

Table H.1. Review Team Results

Line #	MYTR#	TFA Project Title	Technical Merit	Solution Viability	# HLW Alt	Potential HLW Alternative Projects: INEEL: SBW Disp	INEEL: Cal Disp	Hanford: Alt TWP	Hanford: WTP	Hanford: SST	Hanford: Early Clo	SRS: Salt Retr	SRS: HLW Imm	SRS: Retr/ Disp	Other	Total Impact Score	Impacts: Cost	Impacts: Tech	Impacts: Prog	Impacts: ESH	Impacts: Schd	Other?	Proceed?
1	362	Low Water Volume Retrieval Technology	A	A	5			X		X	X	X		X		21	H	H	M	M	H		Y
2	773	Solubility of Troublesome Components	SA	SA	1				X							21	H	M	H	M	H		Y
3	359	New Waste Retrieval System/SRS Retrieval Roadmap	A	A	5			X		X		X	X	X		19	H	H	M	L	H		Y
4	367	Hanford Vehicle-Based Retrieval - SST C-104 Project W523	SA	SA	4					X	X	X		X		19	H	M	H	M	M		Y
5	584	Solid-Liquid Separations Filter Optimization and Process Enhancement	SA	SA	3	X			X			X				19	H	H	H	L	M		Y
6	773	Improve Waste Loading in HLW Glass/Liquidus Model Implementation	SA	SA	2				X				X			19	H	H	H	L	M		Y
7	175	NDE of Concrete Walls and Dome of SST	A	A	4					X	X			X	X	17	M	M	M	H	M		Y
8	769	Hanford Processing Rate Improvement (sulfur in LAW)	SA	A	5	X		X	X	X	X					16	H	M	M	U	H		Y
9	157	Leak Site Mitigation Technology - Tank Leak Site Self-Sealing Enhancements	A	A	4			X		X		X		X		15	M	M	M	M	M		Y
10	157	Tank Remote Repair System - Remote Tank Leak Repair	A	A	4			X		X		X		X		15	M	M	M	M	M		Y
11	362	Topographical Mapping System (TMS)	A	A	3					X	X			X		15	M	M	H	L	M		Y
12	554	SRS Sludge Chemistry, Solids Formation, and Transport	A	A	1							X				15	M	M	M	M	M		Y
13	768	Melter Design Improvements - Melter Rate and Noble Metals Investigations	SA	SA	6	X	X		X			X	X	X		15	H	M	M	L	M		Y
14	773	Reduction in Processing and Secondary Phases	SA	A	2				X				X			15	H	L	M	M	M		Y
15	7A1	Melt Rate Improvement for High-Level Waste Glass	A	A	6	X	X		X			X	X	X		15	H	L	H	L	M		Y
16	923	Enhanced Grout Formulations for Tank Closure	SA	SA	4	X					X			X	X	15	M	M	M	M	M		Y
17	359	Alternate Mixing Systems - ADMP for SRS	SA	SA	4			X		X		X		X		13	M	M	M	L	M		Y
18	554	Hanford Sludge Chemistry, Solids Formation, and Transport	A	A	1					X						13	M	M	M	L	M		Y
19	554	SRS Saltcake Dissolution	A	A	3			X		X		X				13	M	M	M	L	M		Y
20	554	Hanford Saltcake Dissolution	SA	SA	5			X		X	X	X		X		13	M	M	M	L	M		Y
21	566	Evaporator Chemistry	A	A	3				X			X			X	13	M	M	M	L	M		Y
22	570	SPP	SA	A	2							X	X			13	M	M	M	L	M		Y
23	5A1	Removal of Sr and TRU Elements from Alkaline Tank Waste Using In Situ Generated Magnetite	A	A	2							X		X		13	M	M	M	L	M		Y
24	7S2	Cold-Crucible Melter Evaluation	A	A	1				X							13	M	M	M	L	M		Y
25	719	Define the Residual Solids to be Processed as LAW	A	N	2	X									X	12	M	M	M	U	M		Y
26	175	CNDE Requirements Evaluation	SA	A	4					X	X			X	X	11	L	M	M	M	L		Y
27	566	Understand Evaporator Chemistry at Hanford	A	A	4			X		X	X	X				11	M	L	M	L	M		Y
28	777	Glass Removal Methods	A	A	5				X	X		X	X	X		11	M	M	M	L	L		Y

Line #	MYTR#	TFA Project Title	Technical Merit	Solution Viability	# HLW Alt	Potential HLW Alternative Projects										Total Impact Score	Impacts					Other?	Proceed?
						INEEL		Hanford				SRS			Other								
						SBW Disp	Cal Disp	Alt TWP	WTP	SST	Early Clo	Salt Retr	HLW Imm	Retr/ Disp			Cost	Tech	Prog	ESH	Schd		
29	171	Alternative Air Filtration Technology for SRS Tanks	A	A	3			X		X		X				9	L	M	L	M	L		Y
30	2A1	Validation and Method Development to Allow Routine Analysis of DOE Waste Forms by Laser Ablation Inductively Coupled Plasma	SA	A	6		X	X	X	X	X		X			9	M	L	M	L	L		Y
31	769	Site Integration	N	N	1	X										9	L	M	M	L	L		Y
32	5S1	Removal of Cr from Alkaline Tank Waste through Oxidative Alkaline Leaching	A	N	4			X	X	X	X					7	L	M	L	L	L		Y
33	709	Waste Treatment Process Flowsheet Model	A	A	1	X										5	L	L	L	L	L		Y
34	359	Data Analysis and Modeling of AZ-101 Mixer Pump Data	A	A	5			X	X	X		X		X		15	M	M	M	M	M		N
35	566	DWPF Recycle Stream	A	A	5			X	X			X	X	X		13	M	M	M	L	M		N
36	143	Hanford EN Corrosion Probe/Argentina DST Corrosion Studies	A	A	3	X				X					X	9	L	M	L	M	L		N
37	143	SRS EN Combined Corrosion and Species Probe Development	A	A	3	X				X					X	9	L	M	L	M	L		N
38	143	ORNL Stainless Steel Corrosion Probe Development	A	A	3	X				X					X	9	L	M	L	M	L		N
39	143	INEEL Stainless Steel Corrosion Probe	A	A	3	X				X					X	9	L	M	L	M	L		N
40	508	NPOx Decontamination System	N	N	3	X						X			X	7	L	L	M	L	L		N
41	508	Identification and Evaluation of Emerging Technologies	N	N	1										X	7	L	L	M	L	L		N
42	555	Aluminum Removal from Tank Sludges	A	D	4			X				X		X	X	7	M	L	L	L	L		N
43	363	Chemical Tank Cleaning at INEEL	A	N	1	X										5	L	L	L	L	L		N
44	376	Waste Conditioning/Slurry Transfer	N	A	3					X		X		X		5	L	L	L	L	L		N
45	3S2	SST Retrieval from Potential Leaking Tanks	A	N	2					X				X		5	L	L	L	L	L		N
46	175	Small Roving Annulus Inspection Vehicle	A	N	1										X	1	L	NO	NO	NO	NO		N
47	175	Remotely Operated NDE System with DST Inspection System - TSAFT	A	N	1										X	1	L	NO	NO	NO	NO		N
48	1S1	Generic HLW Tank Lay-Up Alternatives Evaluation Methodology	N	N	3						X	X		X		0	NO	NO	NO	NO	NO		N
49	203	Develop and Deploy Vault Sump Sampler	A	A	1										X	0	NO	NO	NO	NO	NO		N
50	203	Modify, Test, and Certify LDUA Sampling End Effector	A	A	1										X	0	NO	NO	NO	NO	NO		N
51	203	Develop Simple Tank Heel Sampler	A	A	1										X	0	NO	NO	NO	NO	NO		N
52	361	Heel Retrieval from WVDP Large Tanks - Floor Wall Washing	A	A	0											0	NO	NO	NO	NO	NO		N
53	361	Heel Retrieval from WVDP Large Tanks - Burnishing Sampler	A	A	0											0	NO	NO	NO	NO	NO		N
54	361	Heel Retrieval from INEEL HLW Tanks - Sprayball-SteamJet	A	A	0											0	NO	NO	NO	NO	NO		N
55	382	Cleaning of West Valley Small Vertical Tanks and Associated Piping	A	A	0											0	NO	NO	NO	NO	NO		N
56	362	Alternative Pulse Jet Retrieval Technology	A	A	5			X		X	X	X		X		21	M	H	H	M	H		M
57	352	Hanford Pit Operations Enhancements	SA	SA	2					X	X					17	M	M	M	H	M		M

Line #	MYTR#	TFA Project Title	Technical Merit	Solution Viability	# HLW Alt	Potential HLW Alternative Projects										Total Impact Score	Impacts					Other?	Proceed?
						INEEL		Hanford				SRS			Other								
						SBW Disp	Cal Disp	Alt TWP	WTP	SST	Early Clo	Salt Retr	HLW Imm	Retr/ Disp			Cost	Tech	Prog	ESH	Schd		
58	501	UNEX	SA	A	2		X	X								17	H	H	M	L	M		M
59	719	Finalize the Validation of Foster Wheeler's Process for Stabilization of RCRA Components	A	N	1										X	15	M	M	M	M	M		M
60	362	Modified Density Gradient Retrieval Technology	SA	SA	2					X		X				13	M	M	M	L	M		M
61	157	Leak Mitigation for Hanford - Leak Mitigation Barriers - Apatite Reactive Zone	N	N	4					X	X	X		X		11	L	M	L	M	M		M
62	278	Dual Coriolis for In-Tank Slurry Monitoring	A	N	3					X		X		X		11	M	L	M	L	M		M
63	376	Pipeline Blockage Locating and Unpluggage	A	A	2					X				X		11	L	M	M	L	M		M
64	777	Dismantlement, Size Reduction of Failed Vitrification Equipment	A	A	2				X				X			11	L	L	M	M	M		M
65	363	Chemical Tank Cleaning at SRS	A	N	2						X			X		8	L	M	M	L	NO		M
66	201	Sludge Mapping and Volume Estimates	N	N	3					X	X			X		7	M	L	L	L	L		M
67	555	High Caustic Enhanced Sludge Washing with Recycle	A	N	2			X	X							5	L	L	L	L	L		M
68	555	ORNL T1 and T2 Sludge Washing and Dissolution	N	A	0											0	U	U	U	U	U		M
69	359	Mixer Pump Operational Improvements	A	A	5			X	X	X		X		X		15	M	M	M	M	M		N
70	367	Russian PMP Application for Hanford A200 Series Retrieval	A	A	2					X				X		5	L	L	L	L	L		M
71	367	SRS Disposable Crawler Deployment	A	A	2					X				X		5	L	L	L	L	L		M
72	748	Russian In-Situ Testing	A	A	2				X				X			9	L	M	M	L	L		Y

Table H.2. Management Team Results

Line #	MYTR#	TFA Project Title	Technical Merit	Solution Viability	# HLW Alt	Potential HLW Alternative Projects: INEEL: SBW Disp	INEEL: Cal Disp	Hanford: Alt TWP	Hanford: WTP	Hanford: SST	Hanford: Early Clo	SRS: Salt Retr	SRS: HLW Imm	SRS: Retr/ Disp	Other	Total Impact Score	Impacts: Cost	Impacts: Tech	Impacts: Prog	Impacts: ESH	Impacts: Schd	Other?	Proceed?
1	362	Low Water Volume Retrieval Technology	A	A	5			X		X	X	X		X		21	H	H	M	M	H		Y
2	773	Solubility of Troublesome Components	SA	SA	1				X							21	H	M	H	M	H		Y
3	362	Alternative Pulse Jet Retrieval Technology	A	A	4			X		X	X			X		21	M	H	H	M	H		Y
4	359	New Waste Retrieval System / SRS Retrieval Roadmap	A	A	5			X		X		X	X	X		19	H	H	M	L	H		Y
5	367	Hanford Vehicle-Based Retrieval - SST C-104 Project W523	SA	SA	4					X	X	X		X		19	H	M	H	M	M		Y
6	584	Solid-Liquid Separations Filter Optimization and Process Enhancement	SA	SA	3	X			X			X				19	H	H	H	L	M		Y
7	773	Improve Waste Loading in HLW Glass / Liquidus Model Implementation	SA	SA	2				X				X			19	H	H	H	L	M		Y
8	175	NDE of Concrete Walls and Dome of SST	A	A	3					X	X				X	17	M	M	M	H	M		Y
9	501	Universal Solvent Extraction (UNEX)	SA	A	1		X									17	H	H	M	L	M		Y
10	769	Hanford Processing Rate Improvement (sulfur in LAW)	SA	A	4			X	X	X	X					16	H	M	M	U	H		Y
11	157	Leak Site Mitigation Technology - Tank Leak Site Self-Sealing Enhancements	A	A	4			X		X		X		X		15	M	M	M	M	M		Y
12	157	Tank Remote Repair System - Remote Tank Leak Repair	A	A	4			X		X		X		X		15	M	M	M	M	M		Y
13	554	SRS Sludge Chemistry, Solids Formation, and Transport	A	A	1									X		15	M	M	M	M	M		Y
14	768	Melter Design Improvements - Melter Rate and Noble Metals Investigations	SA	SA	4		X		X				X	X		15	H	M	M	L	M		Y
15	773	Reduction in Processing and Secondary Phases	SA	A	2				X				X			15	H	L	M	M	M		Y
16	7A1	Melt Rate Improvement for High-Level Waste Glass	A	A	5		X		X			X	X	X		15	H	L	H	L	M		Y
17	554	Hanford Sludge Chemistry, Solids Formation, and Transport	A	A	1					X						13	M	M	M	L	M		Y
18	554	SRS Saltcake Dissolution	A	A	3			X		X		X				13	M	M	M	L	M		Y
19	554	Hanford Saltcake Dissolution	SA	SA	4			X		X	X	X				13	M	M	M	L	M		Y
20	566	SRS Evaporator Chemistry	A	A	3				X			X			X	13	M	M	M	L	M		Y
21	570	Salt Processing Project (SPP)	SA	A	2							X	X			13	M	M	M	L	M		Y
22	5A1	Removal of Sr and TRU Elements from Alkaline Tank Waste Using In Situ Generated Magnetite	A	A	3				X			X		X		13	M	M	M	L	M		Y
23	7S2	Cold-Crucible Melter Evaluation	A	A	2		X	X								13	M	M	M	L	M		Y
24	719	Define the Residual Solids to be Processed as LAW	A	N	2	X									X	12	M	M	M	U	M		Y
25	175	CNDE Requirements Evaluation	SA	A	4					X	X			X	X	11	L	M	M	M	L		Y
26	566	Understand Evaporator Chemistry at Hanford	A	A	5			X	X	X	X	X				11	M	L	M	L	M		Y
27	777	Glass Removal Methods	A	A	4				X	X			X		X	11	M	M	M	L	L		Y
28	157	Leak Mitigation for Hanford - Leak Mitigation Barriers - Apatite Reactive Zone	N	N	3					X	X			X		11	L	M	L	M	M		Y

Line #	MYTR#	TFA Project Title	Technical Merit	Solution Viability	# HLW Alt	Potential HLW Alternative Projects										Total Impact Score	Impacts					Other?	Proceed?
						INEEL		Hanford				SRS			Other								
						SBW Disp	Cal Disp	Alt TWP	WTP	SST	Early Clo	Salt Retr	HLW Imm	Retr/ Disp			Cost	Tech	Prog	ESH	Schd		
29	376	Pipeline Blockage Locating and Unpluggage	A	A	4	X			X	X				X		11	L	M	M	L	M		Y
30	171	Alternative Air Filtration Technology for SRS Tanks	A	A	4		X	X		X				X		9	L	M	L	M	L		Y
31	2A1	Validation and Method Development to Allow Routine Analysis of DOE Waste Forms by Laser Ablation Inductively Coupled Plasma	SA	A	5		X	X		X	X		X			9	M	L	M	L	L		Y
32	769	INEEL Waste Conditioning for Immobilization	N	N	1	X										9	L	M	M	L	L		Y
33	748	Russian In-Situ Testing	A	A	3				X				X		X	9	L	M	M	L	L		Y
34	363	Chemical Tank Cleaning at SRS	A	N	2						X			X		8	L	M	M	L	NO		Y
35	5S1	Removal of Cr from Alkaline Tank Waste through Oxidative Alkaline Leaching	A	N	4			X	X	X	X					7	L	M	L	L	L		Y
36	508	NPOx Decontamination System	N	N	2	X									X	7	L	L	M	L	L		Y
37	709	Alternative SBW Treatment Flowsheet Development	A	A	1	X										5	L	L	L	L	L		Y
38	555	High Caustic Enhanced Sludge Washing with Recycle	A	N	2			X	X							5	L	L	L	L	L		Y
39	359	Mixer Pump Operational Improvements	A	A	3					X		X		X		19	H	H	M	L	H		N
40	352	Hanford Pit Operations Enhancements	SA	SA	2					X	X					17	M	M	M	H	M		N
41	362	Topographical Mapping System (TMS)	A	A	3					X	X			X		15	M	M	H	L	M		N
42	923	Enhanced Grout Formulations for Tank Closure	SA	SA	6	X		X			X		X	X	X	15	M	M	M	M	M		N
43	359	Data Analysis and Modeling of AZ-101 Mixer Pump Data	A	A	5			X	X	X		X		X		15	M	M	M	M	M		N
44	719	Finalize the Validation of Foster Wheeler's Process for Stabilization of RCRA Components	A	N	1										X	15	M	M	M	M	M		N
45	359	Alternate Mixing Systems - ADMP for SRS	SA	SA	3			X				X		X		13	M	M	M	L	M		N
46	566	DWPF Recycle Stream	A	A	5			X	X			X	X	X		13	M	M	M	L	M		N
47	362	Modified Density Gradient Retrieval Technology	SA	SA	2					X		X				13	M	M	M	L	M		N
48	278	Dual Coriolis for In-Tank Slurry Monitoring	A	N	2					X				X		11	M	L	M	L	M		N
49	777	Dismantlement, Size Reduction of Failed Vitrification Equipment	A	A	3				X				X		X	11	L	L	M	M	M		N
50	143	Hanford EN Corrosion Probe / Argentina DST Corrosion Studies	A	A	3	X				X					X	9	L	M	L	M	L		N
51	143	SRS EN Combined Corrosion and Species Probe Development	A	A	3	X				X					X	9	L	M	L	M	L		N
52	143	ORNL Stainless Steel Corrosion Probe Development	A	A	3	X				X					X	9	L	M	L	M	L		N
53	143	INEEL Stainless Steel Corrosion Probe	A	A	3	X				X					X	9	L	M	L	M	L		N
54	508	Identification and Evaluation of Emerging Technologies	N	N	1										X	7	L	L	M	L	L		N
55	555	Aluminum Removal from Tank Sludges	A	D	4			X				X		X	X	7	M	L	L	L	L		N
56	201	Sludge Mapping and Volume Estimates	N	N	4	X				X	X			X		7	M	L	L	L	L		N
57	363	Chemical Tank Cleaning at INEEL	A	N	1	X										5	L	L	L	L	L		N

Line #	MYTR#	TFA Project Title	Technical Merit	Solution Viability	# HLW Alt	Potential HLW Alternative Projects										Total Impact Score	Impacts					Other?	Proceed?
						INEEL		Hanford				SRS			Other								
						SBW Disp	Cal Disp	Alt TWP	WTP	SST	Early Clo	Salt Retr	HLW Imm	Retr/ Disp			Cost	Tech	Prog	ESH	Schd		
58	376	Waste Conditioning / Slurry Transfer	N	A	3					X		X		X		5	L	L	L	L	L		N
59	3S2	SST Retrieval from Potential Leaking Tanks	A	N	2					X				X		5	L	L	L	L	L		N
60	367	SRS Disposable Crawler Deployment	A	A	1									X		5	L	L	L	L	L		N
61	367	Russian PMP Application for Hanford A200 Series Retrieval	A	A	1									X		5	L	L	L	L	L		N
62	175	Small Roving Annulus Inspection Vehicle	A	N	1										X	1	L	NO	NO	NO	NO		N
63	175	Remotely Operated NDE System with DST Inspection System - TSAFT	A	N	1										X	1	L	NO	NO	NO	NO		N
64	1S1	Generic HLW Tank Lay-Up Alternatives Evaluation Methodology	N	N	2						X			X		0	NO	NO	NO	NO	NO		N
65	203	Develop and Deploy Vault Sump Sampler	A	A	2	X									X	0	NO	NO	NO	NO	NO		N
66	203	Modify, Test, and Certify LDUA Sampling End Effector	A	A	2	X									X	0	NO	NO	NO	NO	NO		N
67	203	Develop Simple Tank Heel Sampler	A	A	2	X									X	0	NO	NO	NO	NO	NO		N
68	361	Heel Retrieval from WVDP Large Tanks - Floor Wall Washing	A	A	0											0	NO	NO	NO	NO	NO		N
69	361	Heel Retrieval from WVDP Large Tanks - Burnishing Sampler	A	A	0											0	NO	NO	NO	NO	NO		N
70	361	Heel Retrieval from INEEL HLW Tanks - Sprayball-SteamJet	A	A	1	X										0	NO	NO	NO	NO	NO		N
71	382	Cleaning of West Valley Small Vertical Tanks and Associated Piping	A	A	0											0	NO	NO	NO	NO	NO		N
72	555	ORNL T1 and T2 Sludge Washing and Dissolution	N	A	1										X	0	U	U	U	U	U		N