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Review Committee for the Waste Treatment and Immobilization Plant (WTP) Office of River Protection at Hanford August 22-25, 2011

Robert B. Raines, Review Committee Chair
U.S. Department of Energy

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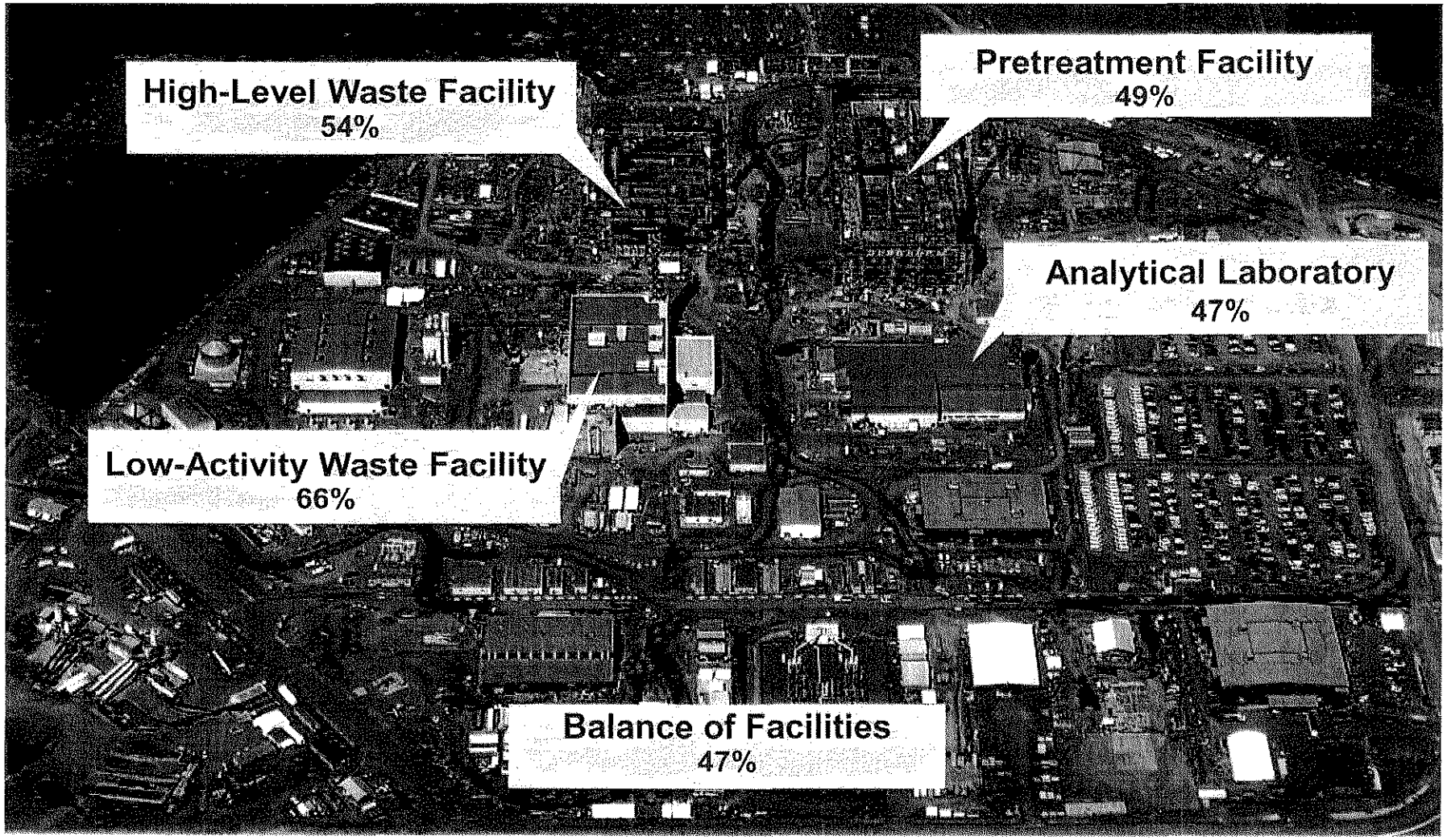
Project Status



Total Project 60%

July 2011 data

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Nov. 4, 2010 Closeout

- Consensus of the Committee: As discussed in the May 2010 CPR report, **cost reduction opportunities must be identified and realized** to deliver at the TPC.

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Overview

- Project effectively managed and led
- Majority of previous recommendations are closed
- Funding uncertainty is the major project risk
- Pulse jet mixing remains unresolved – Refined planning opportunity
- Cost growth exceeding savings opportunities
- Vision 2020 One System Plan re-emphasizes need for Program Secretarial Office portfolio management

Consensus of the Committee:

TPC at risk due to funding uncertainty, cost growth outpacing savings opportunities, and delayed resolution to PJM. **A refined approach to treating the small fraction of HLW should be explored** to take Pretreatment off of the projects critical path.

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Committee Roster

Bob Raines, NNSA, Chairman
Lowell Ely, EM, Vice-Chairman

Technical

David Kosson**	Vanderbilt Univ.
Steve Agnew	Columbia Energy
Kevin Brown	Vanderbilt Univ.
Barry Naft	Environmental Int'l.
Kent Fortenberry	URS
Ken Picha	EM-21

Startup & Commissioning

Chip Lagdon**	S-2
Jim Hutton	EM-20
Bob Warther	B&W Y-12

ESH&Q

Michael Mikolanis**	SRS
Nicole Brooks	DOE-ID
Jim Davis	EM-23
Greg Rowland	ORNL
Ray Wood	Trinity Eng.

Cost, Schedule, Risk

Kurt Fisher**	SC-28
Chris Gruber	Consultant
Jim LaClair	Shaw/Areva
Lenny Mucciaro	EM-62
John Post	LLNL
Al Simonti	Shaw/Areva

Management

Les Price**	Consultant
Jeff Burgan	MA-621
Scott Cannon	SRSO
Tony Polk	SRS
Chuck Swain	Parsons

Observers

Dale Knutson DOE-WTP, Robert Diebold Consultant, Brian Kong OECM, Mark Whitson OECM, Scott Samuelson DOE ORP Mgr., Rick Khan S-2, Dan Lehman* SC-28, Keith Klein Consultant, Jay Glascock OECM

*Special Advisor to the Chair
**Subcommittee Chair

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Charge Memo from S-2 July 29, 2011

- **Technical:** Is the project team making substantive progress on resolving the outstanding technical issues in a timely fashion to complete design and focus on construction and start up activities? Are WTP technical issues being resolved in coordination with tank farm activities to allow for an integrated tank waste system approach to processing waste? Are there any unresolved issues associated with technology, design, or nuclear safety?

- **Commissioning:** Is the startup and commissioning process reasonable and executable? Are adequate resources budgeted for this effort?

- **Environment, Safety, Health (ES&H), and Quality Assurance:** Are ES&H and Quality Assurance programs, controls, and processes sufficiently mature for the project's current stage of development?

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Charge Memo from S-2 July 29, 2011

- **Cost, Schedule, and Risk:** Are costs and schedule estimates-to-complete, including the risks and contingency, reasonable and achievable? Are construction activities proceeding as scheduled with focused constructability reviews to continuously improve the overall effectiveness and schedule?

- **Management, Acquisition, and Prior Reviews:** Is the project being properly managed for its successful execution? Are there integrated capital asset, operations, and acquisition plans in place for the WTP project and Tank Operations Project to ensure optimal decision making for construction and operations of the WTP to meet mission objectives?

- **Has the project team responded appropriately to the recommendations from previous reviews?**

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Writing Assignments

Executive Summary	Bob Raines
1. Introduction	Bob Diebold
2. Technical Systems	David Kosson
3. Startup and Commissioning	Chip Lagdon
4. Environmental, Safety, Health, and Quality Assurance	Michael Mikolanis
5. Cost, Schedule, and Risk	Kurt Fisher
6. Management	Les Price

Appendices

Charge Memorandum

Committee Members

Review Agenda

Cost Table

Schedule Chart

Funding

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Technical Systems Subcommittee

David Kosson	Vanderbilt Univ. (Subcommittee Chair)
Steve Agnew	Columbia Energy
Kevin Brown	Vanderbilt Univ.
Barry Naft	Environment Int'l.
Kent Fortenberry	URS
Ken Picha	EM-21

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2.1 Charge Questions

- **Is the project team making substantive progress on resolving the outstanding technical issues in a timely fashion to complete design and focus on construction and start up activities?**

  Partially. Significant progress has been achieved on some technical issues but overall progress is slower than expected.

- **Are WTP technical issues being resolved in coordination with tank farm activities to allow for an integrated tank waste system approach to processing waste?**

  Integrated resolution of technical issues has progressed.

  Potential funding / contract / organization constraints may prevent sufficient progress.

- **Are there any unresolved issues associated with technology, design, or nuclear safety?**

  Yes.

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2.2 Findings

- The expectation that WTP must be demonstrated at design completion to be able to treat all of the waste puts the WTP project at risk.
- The strategy for resolving PJM vessel technical issues is being addressed by two separate efforts:
  - Computational fluid dynamic (CFD) simulation validation and verification (V&V), and
  - Large-scale integrated testing (LSIT)
- Although there has been progress, the hydrogen in piping and ancillary vessels/quantitative risk analysis (HPAV/QRA) technical issue has not been closed.

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2.2 Findings

- DOE has not directed BNI to address issues from external reviews (e.g., CLIN 3.2) that address WTP operability.
- Systems Descriptions have not progressed adequately for their use in hazard analyses/HazOp reviews, systems engineering reviews and commissioning planning.

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2.3 Comments

Commissioning and Licensing Strategy

- Waste in a small number of tanks is driving PT criticality concerns and PJM vessel design requirements.

  Requiring commissioning of PT prior to HLW creates the risk of cascading delays if technical or non-technical issues delay the completion of PT.

  Similarly, requiring all waste to pass through PT to feed HLW puts HLW operations at risk if PT is delayed in startup or experiences shutdown.

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2.3 Comments

PJM Mixing Technical Issues

- CFD, LSIT and related efforts underway to support PJM vessel design confirmation appear stove-piped; successful and timely resolution of these critical issues will benefit from a more integrated strategy.

  Use of the results from LSIT 14-foot diameter vessel tests as part of the CFD assessment and design confirmation strategy has not been clearly defined.

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2.3 Comments

HPAV

- Incorporation of assumptions and results from the HPAV/QRA evaluations into the preliminary documented safety analysis/documented safety analysis (PDSA/DSA) is central to the HPAV/QRA issue closure but the approach to accomplishing this has not yet been defined.

Risk remains because complete agreement with the DNFSB on implementation into the PDSA/DSA has not been achieved.

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2.3 Comments

Operability

- DOE has not directed the contractor to address comments from external reviews of WTP operability.

System Descriptions

- The quality and/or status of the System Descriptions has precluded their use as a tool to support both current and near term activities such as hazard analyses/HazOp reviews, cognizant system engineer reviews, development of instrumentation and control strategies, and development of startup and commissioning procedures.

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2.4 Recommendations

Recommendation 1 – By October 2011, the WTP project (ORP & BNI) should refine the commissioning and initial licensing strategy to include: (*full wording provided in report*)

- Validation by DOE that a sufficient fraction of the overall amount of waste (e.g., greater than 80 percent) can be processed at WTP based on the plant configuration at project completion (CD-4b).
- Pursuit by WTP and ORP of an integrated strategy whereby the performance of the design is consistent with the waste acceptance criteria and nuclear safety constraints at the time of initial operations.
- Identification by BNI of the wastes that may necessitate criticality or other controls beyond the initially validated PT system performance, and development of controls that restrict processing of the identified wastes.
- Identification by ORP of options for future processing of the restricted wastes by WTP as part of the overall waste processing strategy.

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2.4 Recommendations

Recommendation 1a –

By December 2011, ORP should evaluate the potential benefits and risks of hot commissioning HLW prior to PT.

Recommendation 1b –

By December 2011, ORP and WTP should ensure that the joint interface between Tank Farms and WTP (ICD-14) includes the physical capability (connection point) to supply feed directly to the IHLW facility, bypassing PT.

2.4 Recommendations

Recommendation 2 –

By October 2011, BNI should develop a plan to integrate all efforts that support design confirmation of the PJM Vessels, and assign a technical lead to the resulting integrated project.

The plan should include evaluation of the fidelity and uncertainty of the CFD design basis against the LSIT results including those from the 14-foot vessel, and the uncertainty resulting from the Newtonian analysis assumptions for the assessment of non-Newtonian vessels.

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2.4 Recommendations

Recommendation 3 – By October 2011:

- BNI needs to define and initiate implementation of a process for incorporating the HPAV QRA assumptions and results into the PDSA/DSA, and
- ORP needs to develop a proactive strategy for achieving DNFSB acceptance of the approach for incorporating the HPAV/QRA results in the PDSA/DSA.

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2.4 Recommendations

Recommendation 4 – By December 2011, ORP should address issues raised by external operability reviews of the WTP facility (e.g., WRPS CLIN 3.2).

Issues raised by future operability reviews should be addressed within six months.

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2.4 Recommendations

Recommendation 5 – By October 2011, BNI should establish an accelerated schedule for improving and completing System Descriptions to enable their effective use in current and near-term activities, including hazard analyses/HazOp reviews, cognizant system engineer reviews, instrumentation and control strategy and commissioning procedures.

The related need for a viable System Engineering function is addressed in a Commissioning Committee recommendation.

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Startup and Commissioning Subcommittee

Chip Lagdon	S-5 (Subcommittee Chair)
Jim Hutton	EM-20
Bob Warther	B&W Y-12

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3.1 Charge Questions

- **Is the startup and commissioning process reasonable and executable?**

  Yes. Overall progress for startup and commissioning is appropriate for this stage of the project.

- **Are adequate resources budgeted for this effort?**

  No. Contractor Cognizant System Engineering resources need to be staffed (budgeted and hired) to support commencement of system turnover and testing in 2012.

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3.1 Charge Questions

- **Were previous recommendations satisfactorily addressed?**

Identified startup and commissioning elements carried in the risk register need to be incorporated in the project baseline by May 30, 2011.

No.

The Plan developed for large scale testing needs to integrate the engineering design and cold commissioning testing requirements by January 2011.

No.

The vacancy for the DOE Manager, WTP Startup and Commissioning Integration needs to be filled by December 1, 2011, to support development of DOE Oversight and Staffing plans for start up and commissioning by April 30, 2011.

Yes.

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3.2 Findings

- The commissioning risk associated with the lack of Contractor Cognizant System Engineering function has been transferred to DOE.
- Safety Culture attributes should be included in commissioning and startup programs and plans.
- Environmental and Nuclear Safety staffing risks for Documented Safety Analysis development and commissioning and operations support have potential for adversely affecting commissioning and startup.
- Resolution of open design issues including applicability of DOE STD 3009 have potential for adverse schedule risks on startup and commissioning.

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3.3 Comments

- Contractor Cognizant System Engineers are needed to begin performing their functions in February 2012 to support the schedule for startup and commissioning.
- Linking Safety Culture attributes explicitly to the Integrated Safety Management System and incorporation in the Commissioning and Startup program development and training will strengthen internalization of safety culture.
- Early LAW is an option under consideration. This option is not included in the Tank Farm operating contract.

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3.4 Recommendations

1. DOE-WTP should direct BNI by November 2011 establish and staff a DOE O 420.1B compliant Cognizant System Engineering program to support the Startup and Commissioning schedule.
2. BNI Startup and Commissioning should integrate Safety Culture attributes and behaviors into program development and training by December 2011.
3. BNI should develop processes by January 2012 to maintain the configuration of design and the safety basis during Startup and Commissioning.

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Environmental, Safety, Health, and Quality Assurance Subcommittee

Michael Mikolanis	SRS (Subcommittee Chair)
Nicole Brooks	DOE – ID
Jim Davis	EM-23
Greg Rowland	ORNL
Ray Wood	Trinity Eng.

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4.1 Charge Questions

- **Has the project team responded appropriately to recommendations from past reviews?**

  Yes. Issues with both recommendations from the previous CPR were appropriately closed.

- **Are ES&H and Quality Assurance programs, controls, and processes sufficiently mature for the project's current stage of development?**

  Partially. Self-identified deficiencies with Preliminary Documented Safety Analysis (PDSA) technical bases represents a step backwards. Maturity of other ES&H and Quality programs continues to be commensurate with expectations for design and construction projects.

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4.2 Findings

- With the exception of nuclear safety analysis issues, mature ES&H and QA processes remain in place.
- The suspect/counterfeit items coordinator position has been filled and the program program has begun addressing concerns with counterfeit electronics.
- BNI intends to use the requirements of NQA-1 in conjunction with ASME V&V 20 to develop the validation process for the Computational Fluid Dynamics code FLUENT.
- Oversight and evaluation of factory acceptance testing is performed using a formal process.
- BNI has institutionalized the process to manage release of non-conforming items for delivery.
- All required environmental permits have been established for the construction and operation of the WTP facility.

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4.3 Comments

- The Environmental Plan is outdated and does not reflect current schedule dates and milestones.
- Project delays may result if engineering design documents are not submitted to Environmental Permitting to allow adequate processing and approval time prior to construction milestone.
- Environmental Permit conditions have not been incorporated into operational procedures.
- HLW and LAW Demonstration Test Plans submittal date was recently renegotiated from 2006 to 2018. This date will not support 2016 LAW start date and may not support the 2018 HLW start date.

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4.3 Comments

- BNI is currently keeping pace with the resource needs to process permit modifications; however resources are not adequate to support activities necessary for the commissioning/operations phase.
- The methodology selected for the validation process of the FLUENT CFD code will use ASME V&V 20 as the guiding standard. DOE should evaluate implementation of this standard.
- E&NS resources assigned to Area Project Managers is still insufficient to support the current work scope and schedule as well as making a transition to commissioning/operations.

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4.3 Comments

- There is a growing backlog of technical baseline documents by Nuclear Safety.
- BNI self-identified the fact that some hazard analyses are outdated and there are gaps with the Design Control Database (DCD).
  - This condition opens the project to challenges concerning the validity of the project's Safety Basis and the design's ability to preserve safety functions.
- Senior management attention is needed to resolve the impasse between the Engineering, Contracts, Legal, and Nuclear Safety organizations regarding the applicability of nuclear safety regulations and standards.

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4.4 Recommendations

1. BNI should complete the initial draft of the Demonstration Performance Test Plan by March 2012.
2. Establish and implement a process to incorporate Environmental Permit conditions into BNI operational procedures by March, 2012.
3. Obtain agreement between WTP/BNI and the Department of Ecology by March 2012 for utilization of the Permit process which allows Temporary Authorization for modifications (having potential to cause project delays) to proceed in advance of formal approval.

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4.4 Recommendations

4. By December 2011, BNI should demonstrate to DOE-WTP that the Environment and Nuclear Safety organization has the resources necessary to meet project nuclear safety and environmental requirements on schedule.
5. By October 2011, resolve the internal BNI conflict regarding the applicability of DOE Standard 3009 and the applicability of 10CFR830 to commissioning and testing.
6. BNI should complete an extent of condition review by March 2012, to determine which PDSA revisions are not supported by a technical basis.
7. Develop a BNI plan by May 2012 that ensures all credited safety functions/functional requirements are preserved as design inputs.

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Cost, Schedule, and Risk Subcommittee

Kurt Fisher	SC-28 (Subcommittee Chair)
Chris Gruber	Consultant
Jim LaClair	Shaw/Areva
Lenny Mucciaro	EM-62
John Post	LLNL
Al Simonti	Shaw/Areva

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5.1 Charge Questions

Are the costs and schedule estimates-to-complete, including the risks and contingency, reasonable and achievable?

- Successful completion of the Project within the approved project baseline remains a formidable challenge.
- Significant progress towards completing the Project has resulted over the past two years, primarily due to the actions taken by the new management and leadership on both the contractor and Federal sides.
- The risk management and opportunity capture process instituted over the time period has yielded significant benefits towards achieving the Project cost and schedule targets.
- Continued application of this combined management approach will support completion to within 5% of the TPC, based on the committee's assessment and contract funding profile.
- Further cost savings may result from the review and potential implementation of technical approaches presented by the broader committee.

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5.1 Charge Questions

Are construction activities proceeding as scheduled, with focused constructability reviews to continuously improve the overall effectiveness and schedule?

Physical progress continues; however, design closure issues continue to impact construction execution. Potential funding shortfalls are deferring planned staffing growth to support the schedule.

Were the recommendations of the last review addressed?

Yes

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5.2 Findings

- The Total Project Cost (TPC) of the project is $12.263B
- The current budget at completion (BAC) is $10.560B
- The current control account manager (CAM) estimate at completion (EAC) is $10.733B
- Project Management Reserve (MR) /Contingency is currently $876M or 20% of work remaining
- Current work remaining is $4.467B
- Current work Remaining EAC is $4.616B
- Overall project Design / Engineering is 84% complete
- Overall project procurement is 60% complete
- Overall project construction is 56% complete
- Overall Project is 60% complete
- Total Project CPI – 1.00, SPI – 1.01

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5.3 Comments

- Based on the current approved funding profile, the committee has identified a potential overrun of approximately $800 - 900M.
  - A $350M opportunity has been identified based on a phased CD-4 approach
    - The "CD-4" BCP is in the Acquisition Executive approval process
    - Costs for post CD-4 activities will remain in the contract
- Some significant technical issues have not been captured in the risk program.
- Threat (cost growth) identification is continuing to out-pace opportunity (cost savings) identification.
- Risk events that have occurred are not consistently incorporated into the project baseline in a timely manner.

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5.3 Comments

- A life cycle cost analysis to inform the combined WTP and Tank Farm portfolio management process is yet to be completed by DOE ("One Vision").
- Current Variance at Completion (VAC) exceeds the available MR by $64M.
- There has been movement of Budgeted Cost of Work Scheduled (BCWS) / schedule activities ($50M re-sequenced out of FY-11).
- Between January and July 2011, nearly 7% of the remaining to-go scheduled activities were moved.
- Congressional appropriations that significantly impact the contract funding profile will result in significant cost increases and schedule delays for the Project.

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5.4 Recommendations

1. DOE-ORP initiate a cost benefit analysis of the "One System" approach by November 1, 2011.
2. DOE finalize the decision regarding the phased CD-4 BCP to inform the "One System" analysis.
3. BNI and DOE-WTP complete Forecast Update 5 by January 2012.
   - Identify risks that may result from current unresolved technical issues
   - Incorporate changes to technical approach
   - Reflect realistic expectations of productivity
   - Incorporate all very high probability threats
   - Federal analysis of EAC available to subcommittee at next review

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Management Subcommittee

Les Price	Consultant (Subcommittee Chair)
Jeff Burgan	MA-621
Scott Cannon	SRSO
Tony Polk	SRS
Chuck Swain	Parsons

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6.1 Charge Questions

- **Is the project being properly managed for its successful execution?**
  Yes. Both DOE and BNI have highly qualified management and leadership teams, which is absolutely necessary recognizing the size and complexity of the project and the difficult external interfaces.
- **Are there integrated capital asset, operations, and acquisition plans in place for the WTP project and Tank Operations Project to ensure optimal decision making for construction and operations of the WTP to meet mission objectives?**
  Not yet. Integrated plans are in development (WTP is nearly complete) and show promise.

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6.1 Charge Questions

- **Did they properly respond to previous recommendations?**

  Yes.

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6.2 Findings

- DOE and BNI leadership teams are highly qualified and are working well together.
- Disciplined project management processes are in place and being followed.
- WTP presented strategies for licensing, a "one system" approach to WTP-TF integration, and ideas that may have potential for cost and/or schedule improvements.
- EM HQ does not have a program portfolio manager in place with responsibility for WTP and TF.

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6.3 Comments

- The revised CD-4 strategy for implementing the phased commissioning is endorsed by the Committee.
- A strong concerted effort has been initiated to integrate the WTP and Tank Farm activities. It is off to a good start with participation by WTP and TF leadership. Detailed planning is underway to identify all necessary activities to meet mission requirements. It is not clear whether funding will support these plans.
- A plan for maintaining continuity of the highly qualified management team should be demonstrated.
- ORP has allocated sufficient resources to administer the BNI contract. Contract actions are being addressed in a prompt manner.

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6.3 Comments

- Opportunities exist to optimize the startup and operational strategy. For example, present understanding is that problematic wastes exist in a small number of tanks. Consideration should be given to sequencing these tanks later in the overall processing schedule when better technical approaches may exist.
- A plan for aligning the BNI and WRPS contracts to be consistent with the "One System" concept was presented. This would provide the option of extending both contracts through the initial operations period. This approach has merit and should be developed.
- It is noted that ORP has new leadership and a constructive relationship with the WTP Project has been established.

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6.3 Comments

- The process for developing a realistic Estimate at Completion (EAC) for the entire project needs improvement.

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6.4 Recommendations

1. EM HQ needs to establish by November 2011 a strong portfolio program manager with authority and accountability for both WTP and TF, consistent with the "One System" concept. This is similar to recommendations from previous CPRs.
2. ORP should implement a tactical approach to operations and modify the System Plan and associated feed vectors to address near term waste treatment processing constraints and opportunities – by October 2011.
3. ORP should quickly advance the licensing strategy for the problematic wastes that should be restricted from near-term transfers and processing – by October 2011.

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6.4 Recommendations

4. BNI should provide its plan to DOE by November 2011 that ensures continuity of senior and mid-level BNI managers. DOE should develop a plan to retain its key personnel by January 2011.