

FINAL MEETING SUMMARY

**HANFORD ADVISORY BOARD
TANK WASTE COMMITTEE MEETING
January 7, 2009
Richland, WA**

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This is only a summary of issues and actions in this meeting. It may not represent the fullness of ideas discussed or opinions given, and should not be used as a substitute for actual public involvement or public comment on any particular topic unless specifically identified as such.

Welcome and Introductions

Larry Lockrem, Tank Waste Committee (TWC) Chair welcomed meeting attendees, and introductions were made.

Secondary Waste Mass Balance

Mike Korenko introduced the discussion on Bechtel’s Early Low Activity Waste (LAW) Steady State Modeling Run Report.

Mike said the TWC wanted to find out what the study is doing about potential secondary waste issues and possible solutions for contaminants of concern at Hanford. Mike said the committee’s role is not to recommend technological solutions, but to identify criteria that can be applied to a system approach and recommend these criteria as a tool to make informed decisions about alternative paths.

Ben Harp, Department of Energy – Office of River Protection (DOE-ORP) said there is a study that examines options to treat secondary waste such as evaporators and Effluent Treatment Facility (ETF) and looks at the impacts of these options from high, medium and low standpoints. Ben suggested committee members read this study. Mike requested a copy of the study, identified as report number RPP-RPT-37924, Rev. 0.

Rob Gilbert, DOE-ORP, said a specific set of assumptions was given to Bechtel for the Early LAW Steady State Modeling Run. Rob said since Bechtel did not have a pretreatment facility, it did not have evaporators to treat materials going to the ETF. He said issues such as solvent separation and additional treatments need to be considered.

John Mahoney, Waste Treatment Plant (WTP) Process Engineering and Flowsheet Modeling Manager, handed out a packet on the Early LAW Steady State Modeling Run Report. John said if the WTP is built as one entity, an evaporator within the facility could clean up condensation. Since pretreatment is unavailable for early LAW, he said secondary waste streams, which include solids and liquids, need to be cleaned up. The off-gas treatment system is very powerful and captures 99 percent of materials. The report also addresses the volume of solids in secondary waste streams, which is shown in Table 6 of the handout. John said the study included information on which feed tanks would be delivered to the WTP if early LAW activities proceed. He said these feeds would not be clean enough as a liquid to go through this process. Overall, the report was meant to provide information on the contents of secondary waste streams and options for dealing with such waste.

Regulator Perspectives

- Ed Fredenburg, Washington State Department of Ecology (Ecology), stated that one of the downsides of early LAW treatment or early commissioning is the inability to recycle effluent materials back to pretreatment. He said an options study conducted by CH2M Hill considered building a new evaporator. He said he thinks this would mitigate the problem of secondary waste streams by keeping technetium and iodine out of grouted waste form. He said these contaminants should end up in vitrified waste form to the extent possible. Ed asked whether Bechtel or CH2M Hill reviewed each other's material balance estimates. Gary Dunford, Washington River Protection Solutions (WRPS), said they did, and there were no significant differences in the reports.
- Ed said for a long time the focus has been on early risk reduction by retrieving single shell tanks (SSTs) and closing tank farms. More recently, Ecology has recognized it may be more beneficial to focus on actions that will feed the WTP and complete tank operations efficiently. He suggested rewording the fifth bullet under top-level criteria to recommend supporting tailoring funding to begin projects, but clarify that this does not necessarily mean focusing on early risk reduction, as it may be best to focus on what is best overall from a systems standpoint. Mike suggested rewording this item to say: Balance the criteria of establishing funding and mitigating risk by focusing on the endpoint.

Committee Discussion

- Mike asked whether further development of bulk vitrification is still an issue that needs to be solved with new technologies. Ben said yes, this is true for early LAW treatment.
- Mike said capital equipment is needed for pretreatment. Since the committee's advice is issued on a policy level, he expressed concern that these options are being closed out.
- Larry Lockrem asked when funding for these options will potentially become available. John said this could happen any year, and is dependent on where it falls in the priorities.
- Mike said if any solutions require upgrades of pretreatment facilities, delaying this would create problems. John said a decision has not yet been made on whether early LAW will take place, and right now early commissioning, rather than early LAW, is being considered. He said early LAW is based on a 2014 start date, and now this is unlikely.
- Dirk Dunning asked for the report number Ben referenced in his presentation. The number is 24590-WTP-MRR-PET-08-001, Rev. 0.
- Mike asked whether technetium renewal is being revisited as part of pretreatment. Ben said pretreatment solutions were left as they were, and ion exchange in the vaults was not considered. Ed said technetium ion exchange was included in early LAW studies, but is not presently part of the plan.
- Mike verified that the options do not include a pretreatment base. Ben said the report looked at an evaporator to model the waste stream, but did not look at modifications to the pretreatment facility.
- Al Boldt asked what the timeframe is for early commissioning. Ben said the WTP is replanning its sequence, and until this schedule is known the early commissioning date will be tied to the date for early LAW. Al asked whether this would be in 2019, with a possible acceleration of one to two years. Ben said if early LAW were commissioning in 2016, then that is the date they would go with, but they are still considering what it would take to commission early LAW first. Ed said the configuration differences between these options would depend on the interim pretreatment facility (IPS).
- Vince Panesko referred to page 14, Table 6 of the handout. He asked what the gallons per minute factor used in the chart would be on an annual basis. Vince asked whether this figure was averaged over the year, and if it included all three waste streams. John said yes, these figures are based on model assumptions. He said typically these streams would accumulate and then be evaporated as a batch. Rob said this represents a steady state model, which assumes the stream would be continuous.
- Vince said the 242-A Evaporator is only used two or three weeks per year, and expressed interest in how this study looks at the 242-A Evaporator. Ben said upgrades are factored into the option study's schedule. Vince asked whether committee members could obtain a copy of the option study. Lori Gamache, DOE-ORP, said she will provide the option study for distribution.

- Vince said it sounds like early LAW is a dead issue. Ben said early LAW treatment has changed from its original concept, which was for the full capacity of two melters and a bulk vitrification line. He said currently impacts to the WTP are being considered and modifications are needed. Larry asked whether this change in concept is a funding issue, and Ben confirmed that it is.
- Harold Heacock asked if there is a schedule for when the various options will be addressed, including a path forward. Ben said if DOE decides to go with early LAW treatment, then it will look at the options. Harold asked what it would take to reach a decision on early LAW and secondary waste streams, and if DOE has a plan for a path forward on its waste treatment system. Ben said DOE is working with the new contractor for a new systems plan, which will be out in June. Ben said the study was meant to determine whether early LAW is feasible, and it does not look feasible with the WTP. Rob said the WTP will proceed on schedule.
- Larry asked whether decisions are being made because of budget, and not necessarily because of technical considerations. Ben said no, the priority is to have the WTP operating in 2019. He said modifying the LAW treatment plant takes away some flexibility in meeting the WTP schedule, and factors such as construction and resources are also considered.
- Mike asked about DOE's role if capital changes are needed in the pretreatment process, and who at DOE is head of system planning. Ben said DOE is creating an interface management group to identify issues within the group regarding the system assumptions and system plan document. Larry asked if this group is part of restructuring to support the new contractor. Ben said DOE is elevating this group to make it stand alone, and it will report to DOE's new Activity Manager (AM) for Engineering.
- Al said the early LAW deadline of 2014 was created because of the capital items needed for this process. He said he heard that labor costs could add two or more years to the schedule. Al expressed concern that DOE will not meet the 2019 schedule, even with a 2016 start date for early LAW. He said DOE should continue to pursue LAW vitrification as early as possible.
- Dirk said he is concerned the committee does not have a broad system engineering view of what the problem is, particularly with secondary waste streams. He said he is worried not all options are being considered due to the lack of funding. He said funding issues can be handled, while technology issues cannot.
- Mike handed out a draft of the committee's criteria to use with a systems engineering approach, titled "System criteria to guide the selection of the optimum paths to reduce the risks from the Hanford tank waste." He said committee members wanted to create criteria that could serve as a fundamental guide for decision making. The first section of the advice includes high-level criteria, including solving the secondary waste stream issue before continuing to build the plant; eliminating orphan waste; considering the end state of a project in order to come up with creative and cost-effective solutions; identifying contingency paths whenever possible; and funding promising technologies. The second section includes stakeholder and legal criteria, such as reducing the risk to workers; complying with all legal requirements; honoring

tribal rights; and satisfying the current Tri-Party Agreement (TPA) or proposing improved paths for mitigating risk. The third section of the advice represents guiding criteria, which focus on the need for flexibility in the options. These criteria include considering removing technecium in pretreatment; favoring concentration and isolation/destruction options over dilution and on-site storage; considering the increasing costs of expanding soil and groundwater plumes; and aiming for complete closure of sections of the site or tank farms.

- Mike said committee consensus is needed to take the system criteria to the Hanford Advisory Board (HAB or Board) as advice. Larry said the committee needs to agree on whether to attach the criteria to the systems plan advice (Board Advice 209).
- Larry recommended creating an introduction for the criteria, emailing it to all committee members and then bringing it forward to the Board as advice.

Low Activity Waste Treatment System Plan

Ben handed out a document titled “River Protection Project: Waste Treatment & Disposition.” The first slide of the handout included insights from the analysis of the external review on LAW treatment. The first insight was that no LAW supplemental decision will be made right now. Ben said pretreatment issues such as uncertainties about sodium and technical issues in the WTP need to be resolved before the plant is built. The analysis also concluded that the WTP LAW facility cannot complete the mission within a reasonable timeframe, and high-capacity melters, third melters or some other supplemental treatment is needed. The external review also looked at bulk vitrification, and determined that, due to the increasing costs of bulk vitrification and enhancements in WTP LAW waste loading, the benefits of bulk vitrification are not as great as they were originally perceived to be when looking at life-cycle costs. Ben said the external review determined second LAW is the most favorable work solution from a cost standpoint, and is understood better than any other technology. The review recommended continuing to study the IPS as a contingency to the pretreatment system. Finally, the review concluded that the total mission duration could be minimized by processing transuranic (TRU) waste, as it does not run through the WTP.

Ben said the external review looked at a variety of supplemental treatment options. The options include the WTP only, WTP with early LAW, WTP with bulk vitrification, and WTP with bulk vitrification and early LAW. He said bulk vitrification is listed, but this could refer to bulk vitrification, cast stone or steam reforming treatments, as all three of these options are the same from a cost-benefit standpoint. The variety of supplemental LAW treatment options were compared using two variables for sodium processing – either 60,000 or 90,000 metric tons of sodium, and two variables for mission duration – baseline single shell tank (SST) retrieval volumes and durations, and enhanced SST retrieval rates. Ben said enhanced SST retrieval would occur if technologies are developed to supply the WTP without interruption. With the WTP only, the mission would take more than 70 years to complete. With the River Protection Project (RPP) system plan, bulk vitrification and enhanced retrieval rates would result in a mission duration of 23 to 24 years.

The final portion of Ben's presentation included a discussion of the review team's recommendations, which were divided into high, medium and low priority sections. The first priority is to complete the WTP and begin hot operations by 2019. Ben said part of meeting the 2019 deadline is breaking out the feed delivery upgrades separately in the budget process, creating a separate line item for upcoming budget and baseline activities that is distanced from overall tank farm upgrades. The second highest priority recommended is to develop and implement a sodium management strategy which DOE is coordinating with the DOE Office of Environmental Management (EM) 21 to finalize this. The third high priority is to improve the integrated RPP systems model. Ben said the new contractor has been incentivized to do this, and improvements are an ongoing, iterative process. Medium-level priorities listed by the review team include reducing uncertainties in LAW supplemental treatment capacity needs; evaluating WTP LAW upgrades to increase future WTP LAW capacity; supporting focused technology demonstrations to improve waste retrieval efficiencies; and coordinating with WIPP to refine TRU waste strategy, and adding this to the baseline. The low priority listed by the review team is further development of bulk vitrification. Ben said this is a low priority because LAW treatment is further in the future.

Regulator Perspectives

- Ed said the report effectively addressed major LAW treatment issues, and he agreed with the tentative conclusion that a second LAW facility is probably a better option than bulk vitrification. He also agreed that finishing the WTP and focusing on what will support the WTP, such as tank farm infrastructure, secondary waste and a canister storage building (CSB), should be high priorities. Additionally, he agreed with the high priority assigned to the issue of sodium mitigation and the conclusion that additional treatment capacity for the LAW stream is needed, to avoid operating the WTP far beyond its design life. Ed said he agreed that high level waste (HLW) should be a pacing function since retrieval, supplemental treatment and capacity pretreatment can be moderated or mitigated and more HLW facilities are not going to be built.
- Ed said the LAW treatment report did not address waste feed blending in the RPP system plan, and it has been shown that carefully planning waste retrieval sequencing can improve the feed to the WTP and allow for it to operate more efficiently. He said this makes a huge difference in the number of canisters produced and mission duration. He said this issue will be addressed in upcoming revisions to the system plan, but it was not addressed in this report.
- Ed also commented that 2017 seems too late to make a decision. This date is based on getting a second LAW facility operating by 2024, and Ed said he thinks this date is too late as well. If the WTP starts operating by 2019, early LAW should be operating by 2022. He estimated it would take approximately 10 years to design and procure equipment, which means decisions should be made around 2012. A pretreatment engineering platform, waste-loading studies and sodium mitigation studies should be completed in the next couple of years, which would enable decisions on technology

and capacity for supplemental treatment and ensure WTP efficiency is not handicapped down the road.

- Jeff Lyon, Ecology, asked why waste feed blending was not included in the report. Ed said waste feed blending has an impact on mission duration, and was addressed in the RPP system plan. Ben said one reason the study had model improvements was to run the models faster and see what the resulting benefits are. Jeff asked how long it currently takes for the model to run. Ben said the last model took 18 months, and the initial results will be returned in March. He said the assumption set just got improved, and the goal for future model runs is 6 months. Ed asked whether DOE intends to update this annually, and Ben confirmed that this is the goal.

Committee Discussion

- Dick Smith asked whether WTP LAW upgrades would require changes to pretreatment. Ben said the report looks at this, and recommends fractional crystallization as a promising technology.
- Dick said second LAW looks better in this analysis because it is built later, and the capital costs for coming on later are less than the costs of coming on now. Ben said the study includes other options, such as second enhanced LAW with higher capacity melters. He said not all of the analysis is based on present worth dollars.
- Pam Larsen asked how supplemental treatment and interim pretreatment align with DOE-ORP priorities. She said if Hanford gets funding from the economic stimulus package, the money could go to either one. Ben said interim pretreatment and bulk vitrification are on the bottom of the priority list, so if the package comes through, DOE would need to look at necessary upgrades. He said the first priority is starting WTP hot operations by 2019, and a second priority is increasing retrieval rates through technology development. He said second LAW is supplemental treatment, and is in the 2014 timeframe based on the current analysis. He said this may change by one to two years when the baseline is implemented over the next year.
- Larry asked whether evaluating WTP LAW upgrades that could enable future WTP LAW capacity enhancements is being funded by a separate EM activity, and not from the site. Ben said DOE-ORP is doing some of this evaluation, and DOE-Headquarters (HQ) is doing some evaluation. Larry said some universities have supplemental funding available from mechanisms other than the site. Congress has made statements about the need to direct funding to research at universities, and he asked whether this could potentially provide funding to look at technology needs. Ben said EM-21 is the technology development arm, but is not sure of the answer to this.
- Al said 2017 is a late start date, and a decision should be made sooner. He said it appears this decision was deferred to 2017 to keep a flat funding profile for the WTP. He said the study determined cases including a third melter were expensive and required major modifications for heat removal in the system, but the study did not analyze adding a third melter and maintaining a constant heat removal with the current design.

- Additionally, Al said the study considered two cases of creating additional evaporator capacity – building a new evaporator at the WTP, and building a new evaporator at the ETF. He said the cost difference between these two evaporators was hundreds of millions of dollars, even though the only difference was the evaporators' physical location. Ben said one evaporator was on the secondary waste side and one was on the primary side, so the difference between the evaporators was their shielding and what was going through them.
- Dirk asked whether additional computational capacity for the platform is needed. Ben said this has to do with parameters. Gary said the problem is with the robustness of the computational capacity. Under the current system plan this process is estimated to take two months. Dirk said ultimately a more powerful computational system toolbox and platform for the environmental process would be useful. He said it does not look like the current system has the capacity to handle the most complex computational problems, and suggested this may be future HAB advice.
- Dirk said the report did an excellent job recognizing ultimate constraints that affect how the system works. He said eliminating or reducing the amount of sodium would reduce the amount of waste that needs to be treated, which could cut the mission length and cost in half.
- Vince asked what DOE's obligation is to respond to this report, and who sponsored it. Ben said the report was sponsored by DOE-HQ as a commitment to Congress. He said DOE must take action on each recommendation, and these will be entered in a corrective action process with a completion date.
- Dick asked what the current sodium management plan is. Ben said the current plan aims to address how much sodium exists and how to reduce the uncertainties of what needs to be processed. Dick suggested reviewing what has been done regarding sodium management during the next six months. Larry said until Ben comes out with a path forward, this is not advice the Board could give.
- Larry said Ben mentioned the bulk vitrification category also included cast stone and steam reforming, which are the same from a cost-benefit standpoint. Since bulk vitrification was categorized as a low priority, Larry asked whether this meant the other two technologies were also low priorities. Ben said bulk vitrification has already been tested, and more work and testing would be needed to address the other technologies.
- Larry said the committee had a presentation on steam reforming two months ago, and it looked like a viable option with potential available funding. Ben said alternative options are always being tested, and DOE was also looking at a secondary waste site for steam reforming.
- Dirk asked how sodium management is defined. DOE is looking at aluminum waste loading of glass and the hydroxide solutions of ions in waste, as well as other extreme forms of sodium recycle. Removal options, fractional crystallization and modified vitrification processes are all part of this evaluation.
- Mike said sodium management relates to alternatives if Yucca Mountain does not open. Since sodium weakens glass, the glass logs cannot be stored at Hanford

indefinitely. He asked whether DOE has considered a super stretch performance vehicle for solving this issue. He said this could be a contracting suggestion for how to stimulate this solution.

Committee of the Whole Debrief

Larry said the December 11, 2008 Committee of the Whole (COTW) meeting looked at baseline assumptions. He said the River and Plateau committee (RAP) and TWC were asked to review the following objectives and provide input to the Budgets and Contracts Committee (BCC) to help formulate budget advice to take to the Board.

1. Review the assumptions and dates in System Plan Rev. 4 and identify important work that is not currently included in this.
2. Review the Integrated Priority List (IPL) for DOE-ORP and identify areas that should be funded if additional funding becomes available.
3. Review the schedule for retrieval that DOE and Ecology agreed on.

Ben said DOE is currently negotiating the final set of assumptions for the system plan. DOE has briefed and obtained input from Ecology on these assumptions, which have to get contractor agreement on them before DOE can release them through the system plan. He said this will possibly happen in early February, but he is not sure whether it will line up with the February Board meeting, so it may have to wait until the April Board meeting.

Regulator Perspectives

- Ed said two cases are being evaluated – one is a baseline case and the second is comparable to HAB Advice #209, which talked about constrained and unconstrained funding cases. The second case has been labeled a regulatory case, and he said he would prefer it not to be called that, as it implies the regulatory agencies have fully participated in these assumptions, which they have not. He said it would be better to call the second case an unconstrained funding case. He said Ecology would like the designation of two or three double-shell tanks (DSTs) to be receiver tanks for specific waste types in the next system plan, which would achieve planned blending and feed the WTP more efficiently. He said the Hanford Tank Waste Operating System computer model (HTWOS) computer is not currently configured to do that, and it would require a significant overhaul to the model. Ed said there is not time to include this in system plan Rev. 4, but Ecology hopes that by Rev. 5 the model can be modified to look at this option.
- Jeff said he agrees with Ed, and would like to see the limitations of the HTWOS model improved. He said HTWOS improvements would be helpful for criteria that are priorities, such as tank farm closures. Ecology is planning to have a conversation with DOE on specific changes it would like to see in the system plan. Ed said Ecology has seen the assumptions, and one criterion for the second case is to finish

treating waste in 2047. He said Ecology does not think this is an acceptable end date for completing the treatment mission. Ben said this date is a comparison criterion, not a success criterion, and the completion of waste treatment may be faster.

- Jeff said this milestone addresses Ecology's concerns specifically, but the agency expects to see the opportunity for a case that expresses its input, although this may not be in Rev. 4. Ed said the three meetings with DOE-ORP and WRPS have been instructive, and Ecology appreciates the opportunity to meet with them.
- Jeff said tank retrieval should be a high priority, and recommended that the retrieval of two tanks per year be included in the baseline.
- Jeff said Ecology believes infrastructure is a critical issue that is not often discussed. Larry asked whether infrastructure falls within the mission support contract (MSC) cost. Ben said this is not captured in the MSC cost. Jeff said this relates to DST space and infrastructure design.
- Jeff said evaporator upgrades need to be done, as these are a single point source failure. He said the sooner these get done, the better the process is.

Committee Discussion

- Bob Suyama asked if the goal is to bring forward advice from the BCC with an attachment from the TWC that includes its advice for prioritization. Harold said the BCC would like to wrap TWC's input on priorities into its advice.
- Harold pointed out that the DOE-ORP priority list shows funding being spent on monitoring tanks that are sitting on the site, and the amount of retrieval being accomplished is approximately one tank per year.
- Al said the priority list has \$690 million for construction of the WTP and \$52.4 million for bulk vitrification. He asked whether the list was outdated, and why money is not being spent on early pretreatment. Larry said the committee needs to discuss prioritizing this funding. Ben said the list was created two years ago when the budget cycle began. He said since this is an expense-funded project, money can be re-prioritized within the project baseline summary (PBS). Pam said this was put forward with the funding request, and since bulk vitrification is not proceeding, there was a shortfall in the 2009 budget. Ben said two years ago \$50 million was expected for bulk vitrification, and this has been redistributed.
- Maynard said it would be helpful to see a list that reflected current priorities. He said the committee should come up with priorities if additional funding is available, and if funding comes through from the economic stimulus package this could be distributed among the top priorities.
- Mike said some performance assessments of technical options were not funded, and asked how this is reflected in the priority list. Ben said the IPS was not funded, so the secondary waste treatment that went with this was not funded. He said this is reflected in the IPS section of the list.

- Dick asked if system plan Rev. 4 is being done on a system engineering basis, and whether questions of changing the process are going to be evaluated. Ben said these questions are not addressed in this first model. DOE could not do all the model improvements in one year, and this will be an iterative process.
- Al said after building the WTP, funding early LAW and the IPS should be top priority, resolving the sodium issue should be second priority, initiating the budgeting cycle for supplemental LAW treatment should be third priority, and addressing the issue of evaporator capacity should be fourth priority. He said these items are not reflected in the FY 2010 priority list.
- Dick said the resolution of the sodium issue should be first on the priority list, because this drives other items. There is also the need for early LAW and supplemental LAW treatment.
- Mike recommended setting aside a set amount of funding, such as \$1 million, to create a capstone systems engineering group to come up with creative solutions. Jeff asked Mike to define capstone engineering modeling. Mike explained that capstone engineering modeling looks at the end state of the entire site, and brainstorms creative, unconstrained ideas to accelerate the process and challenge the status quo. Maynard asked whether contractors should be included in this process. Mike agreed that contractors should be included, but under the lead of the DOE. Dirk said this process is not just forward-looking, but it considers all constraints, risks and cost impacts, and how these affect the system. Bob suggested using a term other than “capstone” to describe the engineering model. Mike suggested using “strategic system engineering” as an alternative.
- Dirk said the recommended priorities should focus on issues that have a ripple effect, such as secondary waste, as these need to be analyzed based on their end disposition.
- Maynard said if priority issues cannot be funded, these will be transitioned over to what should be funded if additional funds are available. He said this may get into super incentives and stretch goals.
- Larry asked about the capacity of the WTP, and how many tanks per year would need to be processed to keep it operational. Ben said seven simultaneous retrievals is the maximum for the WTP, but due to the DST space issue, it can only do one or two tanks at a time. Jeff said there is not an HTWOS model on this, but understanding variables that affect blending opportunities can help show how DST space would be beneficial, especially if the WTP does not start on time.
- Larry said DOE has a scenario for the WTP with one or two tank retrievals, and asked whether building up to more retrievals is possible. Ben said yes, tank retrievals are to ramp up over a number of years. Jeff said this relates to DST space, as more retrievals are completed, less funding is needed for keeping these operational. Maynard commented doing this now is important when considering potential funding from the stimulus package, as its objective is to quickly create jobs.
- The following priority list was created:
 1. Capstone engineering model, or strategic system engineering model (at DOE)
 2. Sodium resolution

3. Tank retrieval (2 tanks per year)
 4. Start up of WTP
 5. Evaporator capacity
 6. IPS-Early LAW
 7. Supplemental LAW
- The priority list will be taken forward to the BCC meeting.

242-A Evaporator

Vince gave a report on the 242-A Evaporator, reviewing key issues of its operability and focuses on the Kossom report. This external review concluded that a careful evaluation of the present evaporator needs to be made to determine whether it should be replaced, as it represents a single point failure mode for tank farm operations. The report also concluded that current planning does not support the requirements necessary for startup operations in 2019.

Vince said a risk management plan discusses single point failures of 242-A and items leading up to the WTP. Vince said he would pass out this document at the next meeting. He said this report concluded that the worst-case impact for 242-A single point failure is a five-year impact on the retrieval and waste treatment schedule, and a \$4.6 billion cost impact. Vince said this cost does not include the cost of replacing the evaporator, which is an estimated \$100 million and brings the total cost close to \$1 billion. Vince said he would hand out a copy of the risk management plan at the next TWC meeting.

Vince also discussed potential evaporator upgrades that would extend its mission to 2039 and beyond. A current life-extension study on the 242-A Evaporator is underway. This was previously done in 2001, and an updated report will be released in 2009. Vince recommended waiting for this document before having a committee discussion on the issue. Vince said upgrades to DSTs need to be made, in addition to evaporator upgrades. He suggested the committee ask DOE to update the two-year-old document that evaluated this.

He said 242-A Evaporator is not the only single point failure facility; it is surrounded by tanks and transfer lines that are also single point failure. He requested DOE provide him with the programmatic risk document.

Vince included a list of topics for future discussions on the 242-A Evaporator, including a discussion of other single point failure items around 242-A; ways to work around possible single point failure; the capacity in other evaporators; and the monetary considerations of this issue. Vince asked for additional questions from other TWC members, and said he hoped to obtain a future presentation from DOE.

Regulator Perspectives

- Jeff said decision making on the 242-A Evaporator should be balanced with reality. He said limitations on how often the evaporator could run are due to funding. Additionally, working with the SST or DST systems often requires sharing crews. Running the evaporator and making a transfer would require a different scenario. Vince said the evaporator does not have a full-time staff, as Gary mentioned. Jeff said if more tanks are being retrieved each year, more staff would be needed to run the evaporator.

Committee Discussion

- Larry asked what the annual cost is for the 242-A Evaporator. Ben said it costs \$5 million annually, and each campaign is half time. Gary said the evaporator is only staffed for campaigns by tank farm operators.
- Vince asked what the 242-A Evaporator's actual capacity is. Gary said it has a capacity of 40 gallons per minute for operations, and an 80 gallon-per-minute capacity for feed.
- Vince said the e-mails from Glyn Trenchard included in his presentation pointed out that not all waste needs to be run through the evaporator. Gary said not all waste can be, and not all slurry waste is run through it.
- Vince asked if the evaporator is used only when tanks have had a great deal of water added to them. Gary said in the system plan DOE is currently working on, it is for tanks with a terminal-specific gravity and specific gravity of 1.2 or 1.3. He said a large amount of feed is from C Farm retrieval waste, which is assumed to be dry retrieval, and is expected to require a great deal of water as it is moved out. He said the use of tank supernate for sluicing tank solids has eliminated the need to evaporate millions of gallons of waste per year.
- Vince asked whether some of the volume that needs to be evaporated has been eliminated. Gary said the WTP has two evaporators that each has a 28 million-gallon-per-minute operating capacity. He said one runs constantly, while the other runs less, but he does not know what will happen when total operating efficiency (TOE) factors are included in this. He said these evaporators will have spare capacity when the WTP is operational.
- Al said by the time the end point of 2046 is reached, the 242-A Evaporator will be an 80 to 100-year-old facility. He expressed concern the facility would fail if run that long. He said the HTWOS model is not designed for a second LAW vitrification plant or the extra sodium, which will create large additional streams going to the pretreatment facility. Al expressed concern that this will exceed the pretreatment facility's capacity and will need to go to 242-A or another evaporator. He asked whether H2's model is flawed because it does not include the constraint of boil-off capacity.
- Dick asked what the worst failure of the 242-A Evaporator would include and how long it would take to recover from this. Gary said DOE has just starting to use the reliability, availability, maintainability and inspectability (RAMI) operational

research model. He said this model looks at the consequences of failure, and the first version is being built next year.

- Al recommended looking at waste pretreatment, and asked whether the throughput could be low enough that the WTP could process it. Gary said the WTP's evaporator has limits, and cannot have high solids run through its evaporator.
- Vince said if the evaporator fails in 2010, when only one week of evaporation is required, there will be fewer consequences than in 2021, when eight weeks of operation is needed over the year. Jeff said the evaporator has not run more than 11 campaigns in the past five to 10 years, and it is important to look at the reality of this capacity. Gary said before the supernate recycle process was used, more water was needed, which was then boiled off in the evaporator. Since supernate recycle uses less water, he said the future load on the evaporator will be different than in the past.
- Vince suggested a future presentation on the evaporator, once TWC members have looked at the risk management plan.

Disposition of Hanford Waste

Steve Pfaff, DOE-ORP, provided a handout on the cost-benefit analysis for high-level waste (HLW) storage, which includes comparisons between storage options on the Hanford Site. He said the 2007 monitored geological repository (MGR) target was 9,334 immobilized high level waste (IHLW) canisters, and Hanford's estimate for this is 12,000. The WTP will have the capacity to hold 24 canisters, and an interim facility will be needed for additional storage.

The handout includes the capital costs for two different scenarios:

1. A canister storage building (CSB) with the capacity to hold 880 IHLW canisters and a separate Hanford Shipping Facility (HSF) to move the cans to Yucca Mountain. This option is estimated at \$173.8 million, in 2005 dollars.
2. A HSF integrated with a CSB with the capacity to store 2,000 IHLW cans. The capital costs for this option is \$175.3 million, in 2005 dollars, with each additional 2,000 can go into a new module at an estimated \$73.7 million. In 2008 dollars, this would cost an estimated \$209.2 million.

Steve said the best option is the HSF with 2,000 IHLW can storage, to be built north of 2704-HV. This location provides room for expansion to hold up to 12,000 IHLW canisters. He said building an integrated storage and shipping facility would cost approximately the same amount, and allows for the addition of storage modules. He said integrated storage gives three years of storage and an additional year of contingency. The operating costs are not specifically included in the report, but this is estimated to be equivalent for either option.

Steve discussed the design for the CSB, which includes underground vaults, with canisters stacked two-high in each tube. He said vaults two and three do not yet have tubes built into them. He said the CSB would have an open bay concept, with a metal

grid rather than tubes for canisters, which is a design already in place in Great Britain. He said the costs are based on similar facilities that are already in existence, and DOE asked the new contractor to include this analysis in its scope.

Regulator Perspectives

- Ed asked whether this project needs to go through the critical decision (CD) process. He asked the estimated duration of the project from CD zero to readiness, and when DOE plans to start the CD zero. Steve said seven years is the estimate, and he thinks this is reasonable given that designs are already available. He did not have a start time for when the CD process would commence. Ed asked whether this would result in a 2012 start date, and Steve confirmed that this was correct.
- Ed said if the CSB will be needed by 2012, it will probably need to start in 2011, which means it needs to be in this year's budget submittal. He said waiting too long to begin the CSB would impact the WTP, and suggested this go on the priority list for funding created earlier in the meeting, as a sub-bullet under the startup of the WTP priority. Steve said DOE-RL understands the need for storage, either at the CSB or elsewhere, it just needs to be decided how DOE will proceed.

Committee Discussion

- Pam asked whether vitrified glass requires the same guards as multi-canister overpacks (MCOs). Steve said yes, this is his understanding.
- Dick said the canisters created at the WTP must be shipped and unloaded, and asked why an additional shipping facility is necessary. Steve said the WTP is not set up to load rail cars or trucks with more than one item. He said the CSB would have rail bays built in for shipment to Yucca Mountain. The report noted that one advantage of having an integrated facility is minimizing some transfers, such as between manufacturing, shipping and storage.
- Dick said he designed the front end for the monitored retrievable storage (MRS) facility, and offered to give recommendations. He also suggested looking at holding bins and storage designs at the Office of Civilian Radioactive Waste Management (OCRWM).
- Pam asked whether the facility would need to be covered in an Environmental Impact Statement (EIS). Steve said he did not think so, as a tank waste remediation EIS was developed years ago in anticipation of storage of canisters at Hanford. He said he believes the previous EIS would cover this facility.
- Dick asked how much storage space is available in the existing CSB. Steve said the existing CSB will have a capacity of 880 canisters, but vaults two and three need to be completed before anything can be stored there.
- Maynard Plahuta asked how the planned capacity of 2,000 for the shipping facility was generated as a starting point for the expansion of up to 12,000 canisters. Steve

said he did not know where the 2,000 starting point came from, but that these numbers are based on three years of storage, plus an additional year for contingency. Maynard expressed concern that the CSB would need to be added onto before it was completed.

- Bob said a system is needed for transferring materials into storage. He said the MCOs brought in from K Basins had to be transferred to a highly insulated system to be protected, and glass logs will also be highly radioactive. He asked whether these materials will need their own shipping facility and if cost estimates were done for transfers from the CSB to Yucca Mountain. Steve said these materials will be transferred from the CSB to the Hanford shipping facility and then to Yucca Mountain. He said there are already trailers for moving materials from the CSB to the HSF. He said the CSB has an elaborate assembly to transfer materials to the tube. Once the materials are inside a totally shielded vault, a crane will move them inside the vault.
- Al commented that the U.S. Nuclear Regulatory Commission (NRC) will potentially get involved in the CSB, and asked what the NRC's requirements would be. Steve said he did not know, and would have to look into this issue.
- Larry said the Hanford estimate was greater than 12,000 IHLW canisters, and the CSB could be expanded to hold up to 12,000 IHLW canisters. He asked whether the facility would be capable of holding all HLW potentially generated by the WTP. Steve said yes.
- Dirk asked if the materials are packed for shipping to Yucca and ultimate disposal as they leave, rather than when they enter the facility. Steve said he assumes they will be packed to meet Yucca's waste criteria requirements before they are shipped, to avoid storing it with overpack in Hanford's facility.

Single-Shell Tank Integrity Expert Panel

Rob Davis said the draft of advice on single-shell tank (SST) integrity distributed at the last TWC meeting did not get committee consensus. As the committee tracks this issue, they may want to develop advice. Mike Terry, Perot Systems Government Services, facilitates the group for the SST waste integrity study and can discuss key items the TWC would like to see included in the study. Mike said the first of two workshops on SST integrity is planned for January 26-28 in the Columbia River Room of the ETB Building. Mike said since he last addressed the committee, there has been one addition to the expert panel: Karthik Subramanian from the Savannah River National Laboratory (SRNL), who has conducted materials work related to tanks, including leading the effort to look at liquid-air interface corrosion, which is an important issue for DSTs. Potential presenters at the workshop have been notified, and Mike said an outline for the workshop's agenda will be released the following week.

Regulator Perspectives

- Jeff Lyon, Ecology, asked the difference between the report that will result from the SST panel and an implementation plan. Mike said recommendations will be part of the panel's report, and an implementation plan will come from the tank farm contractor.
- Jeff said Ecology was concerned about missed milestones resulting in storage of materials in SSTs beyond 2019. He said the agency would like to make informed decisions about changing the dates of these milestones, and said he hoped the expert panel would provide insight on this issue.

Committee Discussion

- Larry said he would like Rob to provide a debrief to the TWC following the January workshop, so the committee has a more comprehensive understanding of the topics discussed.
- Vince said DOE conducted an integrity study in 2002, which concluded that the concrete portions of SSTs were not going to fall apart, and that it was difficult to tell the condition of the interliner, or steel portion of the SSTs, due to a lack of technical capability. He asked why a second study on this topic was needed. Mike said technology has advanced, and there are ways to look at the liner of the SSTs and how much can be done to address this issue. Finally, the panel will look at mitigation strategies for the retrieval process, and whether there are actions that can be taken now to improve the integrity of SSTs.
- Pam asked if doing core samples of empty SSTs to look at the metal lining will be considered. Mike said he could not speak to what the panel will recommend, but this is something that will be considered. Rob said this idea was previously mentioned at a workshop. He said the latest corrosion studies show dry salt cake storage may not be the best option due to the hygroscopic nature of the waste, inhibitors cannot be added. Rob asked whether these items will be addressed. Mike said when the panel discusses expectations, these will be discussed and participants can also add other topics.
- Rob asked at what level the Board could participate in the workshop, and whether it could address the panel. Mike said the workshop is open for discussion from all participants. Rob encouraged TWC members to attend portions of the workshop of interest to the committee. Mike noted there will be closed sessions on Wednesday morning, followed by a management briefing, which will be open and will address results from the panel, including what was learned, what the panel still needs to know more about, a path forward, and will hopefully announce the second workshop.
- Rob asked what would take place at the second workshop. Mike said the second workshop would address final questions, put together recommendations, discuss minority opinions, and generate information to complete the panel's written report. The report will provide recommendations, without schedule or funding considerations, and will most likely be completed by the end of the fiscal year.

- Pam said Susan Leckband had hoped the TWC would come forward with advice on SSTs. Rob said the most constructive way to issue advice is to create a list of priorities once the recommendations are released.

Discussion on Advice Regarding the Availability of Repository Space

A draft of the advice titled “Availability of Deep-Geologic Repository Space is Essential to Completion of Hanford Cleanup” was distributed to committee members for review. Mike said it is necessary to consider the consequences of not having a deep geological repository for Hanford waste. It is unclear whether the NRC study on Yucca Mountain will be funded, and the issue managers agreed to communicate the need for a repository to the new administration and focus on defense waste as well as spent fuel. Canisters would have to be over-packed to remain at Hanford, which creates considerations of long-term operational costs. Additionally, risks at Hanford increase when materials are stored at the site in locations other than underground storage. Mike also noted it is necessary to look at Yucca Mountain’s waste acceptance criteria, as this requires more durable glass. Mike said the timing for issuing advice on this is timely, as it would need to be in the budget submittal, and he would like the TWC to bring this advice to the full Board.

Committee Discussion

- Steve said bullets three and four look like sub-bullets to bullet two, as changes in glass quality requirements would result in changes to vitrification plants and possible replacement of tanks and infrastructure.
- Larry asked whether the TPA can still be met if the glass stays at Hanford in a deep geologic repository. Harold said he does not think the TPA addresses this, as it was always assumed it would be shipped off-site.
- Gerry said this issue is the reason a CSB was made a priority in 1996, and the TPA agencies agreed on this solution, which was based on input from stakeholders. He said the Board supported building the CSB and adding to it if needed, which was supported region-wide. He said he thinks the TWC is addressing this from the wrong direction, since onsite storage is better than leaving waste in tanks.
- Pam said she thinks this advice should go forward. She said the Board spent a great deal of time looking at MCOs, which are robust, but has not taken that same approach to vitrified waste. She said this is an issue the Board should consider in the future. Gerry said the advice needed to be revised before it is taken forward to the Board. He said the HAB should not create advice that is dependent on Yucca Mountain opening.
- Al said glass is processed for mixed waste, and asked what the state’s stance is on a storage facility. Ed said the state allows for the storage of mixed HLW. Al asked whether the final closure of the site would have to wait until this waste was disposed

of. Ed said the site cannot be closed if mixed waste is still on site. He said he is not sure of the state's position on long-term storage.

- Rob said the geologic disposal issue came out of the Nuclear Waste Policy Act, and the National Science Foundation (NSF) has reviewed and endorsed what the scientific process should be. He said the license submittal for Yucca Mountain was on schedule, and the NRC has 18 months left to evaluate this. Rob recommended submitting this advice with a presentation review from DOE on the process, as this would provide appropriate context. Jeff asked whether this advice is necessary at this time. Rob said it would be useful to recommend more robust facilities in case longer storage at Hanford is necessary.
- Maynard said the Board's key is contingency planning, and wise management says Hanford should have a backup plan for storage. He emphasized that this is a political process, not a technical issue, and now is the time to put this advice forward, especially with the new administration.
- Vince asked whether the CSB would be considered contingency planning, and Mike said this is one important aspect of it. Pam said CSB is a structural contingency, not a glass loading contingency.
- Vince said the additional cost of storage at Hanford needs to be weighed compared to not proceeding with the repository at Yucca Mountain. Maynard said the technical aspects, as well as the costs, should be considered.
- Thomas Bailor, Confederated Tribes of the Umatilla Indian reservation, said he would like to see this issue be decided. He said a legally required study on the possibility of a second repository in the United States is due in 2010.
- Jeff Luke asked why the committee is proposing advice when DOE is already planning for the possibility of storing glass logs on long-term basis. Steve said the CSB is not yet designed, and there is the ability to make the facility and its canisters more robust. He said if the concern is long-term storage, this is going to result in a greater number of canisters.
- Vince said the CSB has two vaults, and asked whether it was already determined that canisters will be put in there. Steve said backfitting would be necessary to store the glass logs in the CSB, so there is still uncertainty on this. Vince said submitting this advice beforehand could have an impact on this decision.
- The committee revised the draft of the advice based on members' input. It now reads:
 - DOE's High-Level Waste (HLW) disposal strategy assumes that a licensed deep geologic waste disposal repository will be available in the near future for disposal of vitrified waste from Hanford and other DOE sites. If the national program to site, evaluate and license a HLW deep geologic disposal site is seriously delayed, very large cost and schedule increases at Hanford can be expected. The Hanford Advisory Board and the communities of the Northwest believe the nation needs a deep geologic repository via a scientifically valid process for its selection. DOE should use a system approach for contingency planning at Hanford on the

bases of Yucca not opening on schedule or forever. DOE should plan for a robust long-term storage system site.

Action Items / Commitments

- Lori Gamache will provide the 242-A Evaporator option study for distribution.
- The advice on system criteria, including its introduction, will be sent to all committee members for feedback before moving forward as advice to the Board.
- The TWC's priority list, including examples for specific items, will be taken forward to the BCC meeting.
- Vince will hand out the risk management plan on single point source failures at the next TWC meeting.
- Future committee meeting topics:
 - Follow up on DOE-ORP's response to the LAW treatment system plan review's findings.
 - Briefing on DOE's sodium management plan.
 - Steam reforming decision.
 - OCRWM update on Yucca Mountain license application.
 - Final report on the secondary waste roadmap
 - WTP update
 - Debrief on SST expert review panel workshop

Handouts

NOTE: Copies of meeting handouts can be obtained through the Hanford Advisory Board Administrator at (509) 942-1906, or tgilley@enviroissues.com

- Hanford Advisory Board Tank Waste Committee Meeting, John Mahoney, January 7, 2009.
- System criteria to guide the selection of the optimum paths to reduce the risks from the Hanford tank waste, Mike Korenko, January 7, 2009.
- River Protection Project: Waste Treatment & Disposition, Ben Harp, January 2009.
- River Protection Priority List, Lori Gamache, January 7, 2009.
- Current ORP System Baseline Path Forward, Lori Gamache, January 7, 2009.
- 242-A Evaporator, Vince Panesko, January 7, 2009.
- Figure A-1: Hanford Shipping Facility Layout at Alternative Site 1, RPP-34544, Rev. 1, Steve Pfaff, January 7, 2009.
- Availability of Deep-Geologic Repository Space is Essential to Completion of Hanford Cleanup, Mike Korenko, January 7, 2009.

- Short Biographies for Single-Shell Tank Integrity Panel, Mike Terry, January 7, 2009.
- Single-Shell Tank Integrity Expert Panel, Mike Terry, January 7, 2009.

Attendees

HAB Members and Alternates

Al Boldt	Pam Larsen	Maynard Plahuta
Rob Davis	Larry Lockrem	Gerry Pollet
Dirk Dunning (phone)	Jeff Luke	Dick Smith
Harold Heacock	Vince Panesko	Bob Suyama
Mike Korenko		

Others

Robert Chase, DOE-ORP	Robbie Biyani, Ecology	Tom Bailor, CTUIR
Lori Gamache, DOE-ORP	Madeleine Brown, Ecology	Rico Cruz, CTUIR
Rob Gilbert, DOE-ORP	Annette Carlson, Ecology	Ted Repastry, CTUIR
Ben Harp, DOE-ORP	Ed Fredenburg, Ecology	Molly Jensen, EnviroIssues
Dimple Patel, DOE-ORP	Jeff Lyon, Ecology	Cathy McCague, EnviroIssues
Steve Pfaff, DOE-ORP	Nancy Uziemblo, Ecology	Stan Sobezyk, Nez Perce Tribe
Teresa Sanford, DOE-ORP		Annette Cary, Tri-City Herald
		Gail Laws, WDOH
		Lucinda Penn, WRPS
		David Rowland, Yakama Nation