

**FINAL MEETING SUMMARY**

**HANFORD ADVISORY BOARD  
TANK WASTE COMMITTEE MEETING  
April 15, 2009  
Richland, WA**

**Topics in this Meeting Summary**

Waste Treatment Plant (WTP) Tour ..... 1  
Welcome and Introductions .....**Error! Bookmark not defined.**  
Tank Closure & Waste Management Environmental Impact Statement (TC&WM EIS).. 2  
Sodium Management Plan ..... 6  
Revision 4 System Plan ..... 10  
Mobile Arm Retrieval System (MARS) (joint topic with the Health, Safety, &  
Environmental Protection Committee) ..... 15  
Committee Business..... 18  
Handouts ..... 18  
Attendees..... 19

*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.*

**Waste Treatment Plant (WTP) Tour**

The Tank Waste Committee (TWC) participated in a tour of the Waste Treatment Plant (WTP) site led by Delmar Noyes, Department of Energy - Office of River Protection (DOE-ORP). Delmar said there are four major facilities at the WTP site: the pretreatment (PT) facility, low-activity waste (LAW) facility, high-level waste (HLW) facility and the analytical lab. The project employs 3,400 people, including 1,600 on-site workers, and the total project cost is \$12.263 billion.

After reviewing safety considerations, the TWC toured the LAW facility, which Delmar said is the furthest along in construction. The group viewed the location where one of the facility’s melters will treat LAW. Following the LAW facility, the TWC toured the PT facility. Tank waste will go to the PT facility first, where it will undergo filtration to separate liquids and solids as well as an ion-exchange procedure to remove cesium. Delmar said the Pretreatment Engineering Platform (PEP) testing has demonstrated successful filtration and oxidated leaching and confirmed modeling and design for PT. Tour participants viewed one of the PT facility’s hot bays, where remote-handled (RH) pumps will be located.

The committee would like to return to the WTP site at a later date to spend more time touring the plant to discuss issues such as heat removal capacity, back-up power supply, and waste stream processes.

### **Tank Closure & Waste Management Environmental Impact Statement (TC&WM EIS)**

Mary Beth Burandt, DOE-ORP, announced that the Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS) is scheduled to be published May 15, and provided an overview of its contents. She said the EIS supports retrieval and treatment of tank waste, closure of single shell tanks (SSTs), decommissioning the Fast Flux Test Facility (FFTF) and its support structures, disposition of the FFTF's bulk sodium inventory, expanding or upgrading existing treatment storage & disposal (TSD) capacity, disposing waste from tank treatment, closure and FFTF activities, and potential receipt of waste from other DOE sites. She said the EIS does not support double shell tank (DST) or WTP closure. Mary Beth said they are not making a final closure decision on Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) groundwater remediation or past-practice units, although they do have six sets of cribs and trenches. The TC&WM EIS does not include a decision on whether to restart FFTF or on disposition of cesium and strontium capsules.

Next, Mary Beth reviewed the document's key findings. She said DOE found that the amount of retrieval influences long-term human health impacts. Ancillary equipment, residuals and retrieval leak losses also influence health impacts, but to a lesser degree. Mary Beth said the TC&WM EIS reflects technical maturity in its analysis of primary waste forms. She said some technologies are less mature and do not have as many years of data behind them, and the analysis reflects this. The document discusses options for secondary waste forms and shows that additional treatment or waste-form development may be needed for secondary waste. She said another key finding of the EIS is that cribs and trenches, as well as past leaks, are major contributors to potential long-term groundwater impacts. For SST closure, the document's alternatives include a landfill, partial removal of two tank farms – S and SX, and two clean-closure alternatives. Mary Beth said the inventory and impacts of FFTF are relatively small compared to other sources on site. Regarding waste management, it was found that physical and geological differences exist between the 200-East and 200-West locations, and an off-site waste analysis shows technetium-99 and iodine-129 need to be looked at in more detail for mitigation.

Regarding a preferred alternative, Mary Beth said the agency does not prefer the “no action” alternatives for the three program areas, and prefers retrieval. For the ORP scope

the agency prefers retrieval. She said the agency does not have a preference on supplemental treatment. Additionally, the agency prefers landfill closure for SSTs. For FFTF, entombment is preferred, which means leaving below-grade structures, reactor vessels, piping and other components in place. Mary Beth said the Washington State Department of Ecology (Ecology) was a cooperating agency in the EIS and agreed with DOE on many areas of analysis, including groundwater data and information, quality assurance requirements, a technical guidance document, the overall approach to vadose zone and groundwater modeling, waste form release mechanisms, and alternative descriptions and alternative analysis. One area of difference between DOE and Ecology's preferences is iodine partitioning in the WTP. Mary Beth said DOE assumed more of the iodine to be sent to secondary waste in a grouted form and less incorporated into the glass, for bulk vitrification and second LAW alternatives, while Ecology wanted the analysis to reflect current WTP design which includes recycling of LAW off-gas treatment scrubber liquids back to the Pretreatment Facility, which results in a higher percentage of iodine incorporated in the glass. She said a sensitivity analysis will be included with the EIS to address this area of difference. Other areas of difference related to tank treatment and off-site waste.

The TC&WM EIS Notice of Availability is scheduled to be in the Federal Register on May 15, and its release will be followed by a 90-day public comment period. Mary Beth said specific dates and times of public hearings have not yet been determined.

### **Regulator Perspectives**

- Jeff Lyon, Ecology, said there does not seem to be a clear understanding of the difference between 200-East and 200-West disposal facilities. Mary Beth said the 200-East disposal facility would be constructed in the current facility's location and a facility with the same design would be installed in the 200-West Area. She said analysis results are needed to understand other differences between these areas.
- Jeff said the key elements Mary Beth presented from Ecology's foreword to the EIS are accurate. Ecology worked with DOE on the document for six years and participated in many different types of analysis, with help from consultants and quality assurance/quality control (QA/QC) procedures. He said Ecology reviewed a pre-decisional Draft Environmental Impact Statement (DEIS), but due to scheduling had limited time to review some issues. Ecology is planning to conduct a full review of the TC&WM EIS and will provide any necessary comments.

### **Committee Discussion**

- Pam asked the original date the TC&WM EIS was scheduled to be released. Mary Beth said June 2008 was the date in the Memorandum of Understanding (MOU).
- Maynard Plahuta asked whether deactivation of FFTF includes deactivation of its support facilities. Mary Beth said it would include deactivation of the support facilities, and there may be facilities outside of the fence line that may be taken down using stimulus funding.
- Jeff Luke asked what kind of retrieval request DOE used. Mary Beth said approximately 4,000 gallons were assumed for each tank retrieval, for a total of 500,000 or 600,000 gallons.
- Harold Heacock asked if tank leaks were considered, since there are SSTs that contain salt cake. Mary Beth said landfill closure removes the waste and takes out 99 percent, which meets the criteria in the Tri-Party Agreement (TPA). Tanks are then filled with grout and tank structure and ancillary equipment are left in place. Harold asked whether all cases looked at removing as much of the waste as possible. Mary Beth said yes, except in the document's "no action" scenario.
- Pam asked about the differences between 200-East and 200-West retrieval locations. Mary Beth said due to their physical locations these areas have different groundwater and geology considerations. She said the lined trenches would have the same design, but a different infiltration assumption based on the cap was used, and that assumption changed the results.
- Dick Smith commented that the EIS looks at the long-term results of capping those sites. Mary Beth said DOE looked at scenarios in which a barrier was installed and scenarios in which the maximum amount of waste was retrieved before a performance barrier was installed. These analyses showed that retrieval matters more than the barrier put in place afterward.
- Pam asked if the EIS impacts Environmental Restoration Disposal Facility (ERDF) operations. Mary Beth said it does not.
- Harold asked whether on-site waste refers to newly generated waste or existing buried waste. Mary Beth said the majority of waste to go to the Integrated Disposal Facility (IDF) is coming from tank farm activities, some waste is coming from FFTF, and a small amount is generated by on-site activities. She said on-site waste does not include continued disposal in the current burial grounds.
- Pam asked if Ecology wrote additional material for the document in regard to supplemental treatment. Mary Beth said Ecology wrote a foreword that includes its opinion on supplemental treatment, and this will be published with the EIS. Ed Fredenburg, Ecology, said Ecology went through a down-select process for supplemental treatment four or five years ago, and major contenders were a second

LAW facility, bulk vitrification, steam reforming, and grout or cast stone. He said the EIS includes analysis of all of those alternatives, and Ecology's position in the foreword is that this decision has already been made.

- Norma Jean Germond asked if actions on other facilities, such as capping the reprocessing plant, are addressed in the EIS. Mary Beth said these actions are included in a cumulative impact section of the EIS. DOE reviewed all of the site's facilities, including the expected end state for each. She said an appendix lists these, including whether they are capped, and a groundwater analysis. She said for facilities without a determined end state that had a choice between removal and capping the tendency was to choose to leave them in place.
- Norma Jean asked if there is a decision on how long capping will last if that option is chosen. Mary Beth said the assumption used was 500 years for the RCRA barrier, at which point the cap would disintegrate. The cap over the 90-percent retrieval case the Hanford barrier was assumed to last longer, performing 1,000 years.
- Maynard commented that one key finding was to close six sets of cribs and trenches, but not putting these through the remove, treat and dispose (RTD) process. Mary Beth said the base option leaves the cribs and trenches in place, but another analysis in a sub-option covers digging up cribs and trenches.
- Maynard asked which cribs and trenches are considered major contributors to groundwater. Mary Beth said in the alternative analysis B, BX, BY, TTX and TY have six sets of cribs and trenches. The cribs and trenches in the CERCLA portion have just as high of a cumulative impact, as large volumes of water move the contaminants through the vadose zone. She said the impacts of the crib and trench charge are evident in the alternative analysis. Maynard asked whether there is a preferred action on these trenches. Mary Beth said there is not because they are under CERCLA requirements.
- Gerry Pollet said the Public Involvement Committee (PIC) advised a significantly longer comment period since with 90 days public hearings would take place in the middle of the summer, which is difficult for public involvement. He expressed concern that the 90-day comment period will be inadequate.
- Pam asked the plan for the 90-day comment period. Mary Beth said public hearings will be scheduled and announced after the EIS is published and distributed.
- Jeff Luke said he understands Gerry's concern that 90 days may be inadequate, and asked if it would be possible to see the EIS before May 15. Mary Beth said the document will be available as soon as the notice of availability is published, which will be in the Federal Register May 15. She said it will also be posted on the DOE's Web site May 15.

- Gerry asked what mailing list DOE will use to distribute the TC&WM EIS. Mary Beth said DOE initially used lists from tank closure, FFTF, the solid waste EIS and the Hanford mailing list. In October there were postcards requesting the type of document people wanted to receive and to refine the mailing list. Dirk Dunning expressed concern that the transparency on this project has been poor and having a short comment period makes it challenging to review such an important document. He said it would be helpful to know where and when public meetings will take place and obtain a copy of the document as soon as possible.
- Gerry said the Hanford Advisory Board (HAB or Board) created a plan for reviewing the TC&WM EIS that required 30 days of review before conducting a workshop to focus on specific areas of interest identified by issue managers. The plan required an additional 30-day period before a public hearing. The Board issued this advice and PIC is drafting a letter suggesting a longer public comment period.
- Pam asked whether the Board received a formal response to this advice. Mary Beth said DOE's response is in concurrence right now, but it identifies the 90-day comment period. She said it would be helpful to have feedback on issues of interest that could guide the discussion of how the HAB will review the TC&WM EIS and what issue managers would like to focus on in the workshop. Dirk said issue managers would need at least a week to review the document to determine this.
- Dirk suggested the TC&WM EIS issue managers meet before the June HAB meeting and conduct workshops in mid-June. Mary Beth said the workshop is set for June 3, which is the Wednesday before the Board meeting. She said it would be helpful to have general subjects of interest identified before the workshop, such as whether the Board is more interested in tank closure than FFTF. Gerry said the workshop agenda needs to include questions to be addressed, rather than just topics. Pam suggested Mary Beth put together an outline for the workshop that issue managers could review.
- Pam proposed that issue managers meet the week of May 18 to further discuss the TC&WM EIS. The issue managers for this topic are Dirk, Larry, Pam and Mike Korenko if he is available and interested. She also suggested that HAB leadership meet with agency representatives.

### **Sodium Management Plan**

Langdon Holton, Pacific Northwest National Laboratory (PNNL), reviewed the sodium technical studies plan and how DOE plans to move forward. He said the plan was issued in January 2009, and its objectives are to update the River Protection Project (RPP) technical baseline and define and prioritize mitigating the cost and schedule impact required by increased levels of sodium. Langdon said the current baseline includes 60,000 tons of sodium, and this could potentially increase to 90,000.

The overall sodium strategy is divided into five parts. Langdon said DOE will first establish a basis for sodium addition by determining how much sodium will be added to support tank waste composition adjustments and retrieval. Some of the work has been done to establish this basis, and he said it will be updated every six months. DOE will then identify technologies. Langdon said the early perception is that DOE will need to execute another project or technology to mitigate sodium impacts. Third, DOE will complete an initial systems case analysis. Langdon said DOE is currently doing this by analyzing the technical and economic benefits of certain technologies for mitigating the impacts. Fourth, DOE will decide which technologies to continue to develop or whether new technologies are needed. Langdon said DOE will look at the cost-benefit of technologies and update the requirement for sodium addition in the baseline by the end of fiscal year (FY) 2011. The technical studies plan is a shared activity between DOE-ORP and DOE Office of Environmental Management (DOE-EM) 21.

Langdon then reviewed the overall schedule for the sodium technical studies plan, which includes sodium addition updates every six months where DOE looks at the anticipated sodium burden. He said this is currently estimated to be 91,000 tons. DOE has done the initial selection of technologies and is currently doing an initial systems analysis. Langdon said they will then finalize cases, prepare a draft report, have DOE-EM-21 conduct an external review, and issue a document at the end of July.

The objective of the initial system case analysis is to consider the technical and economic benefit of the technology, with the goal of supporting decisions for technology development. Langdon reviewed the initial system cases included in the evaluation. He said DOE had to design a new baseline then look at the relative difference between these cases and the baseline. The technologies being considered for sodium mitigation are a second LAW vitrification plant, improvements in high-and low-level glass loading, caustic recycle, adding lithium Bayer to the tank farms, and the old technical baseline of bulk vitrification treatment in the West Area. Langdon reviewed comparisons of the relative benefits in the initial system cases and the revised baseline. The LAW glass model is consistent with the DOE model issued in 2004, and the HLW glass is specified from the one WTP contract. The treatment schedule goes from 2019 to approximately 2054 and is driven by HLW pretreatment. Langdon said second LAW vitrification is sized for the mission, and all waste will go to the WTP except contact-handled transuranic (CH-TRU) waste, which includes 10 tanks.

Langdon said cost information is derived from existing approved baselines and best available sources. He said some adjustments related to schedule duration and removing or adding supplemental treatment costs have been made to the tank farm contractor baseline.

Langdon said technology information is from the best available sources. The lithium Bayer case includes adding a lithium compound to digest waste, which frees hydroxide and is a strategic way to replace the cost of the recycle plant technology. The lithium aluminum compound precipitates and could immobilize a LAW form. Langdon said the lithium Bayer process takes aluminum away from the WTP feed stream and goes to LAW vitrification directly, with the balance of sludge going to the WTP.

Langdon reviewed the calculation approach, which uses the material balance case for each system case and determines the cost benefit for each. He said the cost-benefit analysis is based on existing baselines, with the cost expressed in 2009 dollars. An uncertainty analysis on cost and schedule information uses ranges to reach a probable estimate, which provides a mean value, a mean standard deviation and determines whether there is a statistical difference between the cost values. He said two cases of mass will be evaluated - 91,000 and 75,000 tons - to see whether that is a discriminating factor in the technology-selection process. Near-term activities for the sodium management plan are completing the system case analysis in March or April, preparing a report in April and May, having DOE-EM-21 complete an independent review of the calculations and report in May and June, and issuing a revision of the analysis and report by the end of July.

### *Regulator Perspectives*

- Ed said Ecology is pleased DOE is completing this important work. The Kosson Report that was released in November had three high-priority recommendations: finishing all of WTP's infrastructure and support facilities so it can operate, using systems modeling to ensure effective tools are used to inform decision-makers and completing sodium-mitigation studies to answer major questions that pertain to WTP throughput and how much supplemental treatment capacity needs to change.
- Jeff Lyon said the timeframe is short and thinking out of the box is not limited to two years. He said the sodium problem will endure another 40 years, and this mission could be shortened partway through. Langdon said a decision on the size of the Supplemental Treatment Plant needs to be made by 2015, and knowing how much sodium will be sent to it will affect making programmatic decisions on facilities.
- Ed said the Kosson Report indicates that DOE can make a decision on technology in 2017, but Ecology thinks this decision can and should be made in 2012. The sodium studies will be completed in 2011, including waste-loading studies and phase two of PEP testing. He said by 2012 DOE should be in a position to make this decision.



### Committee Discussion

- Maynard asked whether lithium Bayer technology would get rid of aluminum. Langdon said this looks promising, and from a technology perspective this represents a high risk so DOE will need to make a decision. This technology is currently unfunded, and Langdon said it is only through Areva's efforts that this case continues to be explored. He said it is being considered because it has the potential to help the treatment schedule, which none of the other cases do. It is recognized that any technologies that require new facilities can have significant cost implications unless they can shorten the schedule.
- Pam asked if stimulus money is available to support Areva's work. Billie Mauss, DOE-ORP, said the stimulus money is going directly to infrastructure upgrades. Dirk asked whether New Mexico has agreed to categorize the CH-TRU tanks as TRU waste. Steve Pfaff, DOE-ORP, said this is not yet in writing. Dirk said this has been pending for a number of years but it is unclear how this is going to happen. Langdon said DOE derived the assumptions for the study from Rev 4 System Plan.
- Dirk said previous studies focused on sodium as a major driver of emission at WTP, and suggested that reducing the amount of sodium in the waste can reduce the duration, cost and the amount of glass produced. He said methods such as fractional crystallization should be considered in sodium studies. Langdon said based on DOE's analysis this is driven by the treatment of solids, not the sodium that comes from the tank farms.
- Dirk asked if a second LAW plant would be needed if the amount of sodium is reduced. Billy said even if sodium is removed through fractional crystallization the contaminants would still need to be immobilized. Dirk said the only contaminant fractional crystallization seems to carry with it is cesium, which could go into near-surface disposal with a low risk. Langdon said this issue requires a broader study that DOE is trying to undertake. Given the uncertainty of sodium and the WTP baseline, DOE plans to look at additional technologies and facilities that need to be added.
- Al Boldt said it does not appear DOE has the bounding case of no caustic washing for aluminum removal. Eliminating caustic washing and relying on enhanced HLW loading would greatly accelerate the schedule because pretreatment would no longer be limiting. Additionally, he said performance assessments for contaminants in the waste streams that are different, specifically the lithium aluminum compound, need to be identified. Langdon said the purpose of the study is to determine whether there are technologies DOE should continue pursuing, and a decision is not yet being made. The plan will establish technical development needs that would need to be evaluated during a two-year technology maturation period then assessed again. Al said he thinks a performance assessment on waste forms should be part of the technology

assessment. Langdon said a technology-readiness level for the requirements would need to be established.

- Rob Davis said he agrees with the systematic approach, but expressed concern it will limit the new technologies that are considered. Langdon said identifying candidate sodium mitigation technologies includes reviewing, analyzing and prioritizing priorities before recommendations are made to support systems analysis. He said DOE has more than two years to complete this, so any technologies that will be considered have to be somewhat mature.
- Pam said she is disappointed with this report, and was hoping for a more aggressive plan. Dealing with the sodium issue will reduce costs and lifecycle dramatically, and she noted this has been a priority for the HAB.
- Harold said there are a number of alternatives involved to quantify the problem and look at solutions, but he expressed concern that there will not be one solution that solves the issues of cost and schedule. He said one key element of this is the responsibility of DOE-EM-21 to look at other potential solutions. Langdon said the mission costs approximately \$44 billion, and the cost difference between 60,000 tons of sodium and 90,000 is approximately \$3 billion. He said the operation of WTP as it is now is what is driving the cost.
- The committee recommended that the Board hear about the sodium management plan at the June Board meeting. Rob Davis will prepare committee's remarks with assistance from Dirk. The committee will review a semi-formal DOE report after it is issued at the end of July.

#### **Revision 4 System Plan**

Jian-Shun Shuen, DOE-ORP, provided an update on the Draft System Plan Revision (Rev) 4 and the timeline for completing the plan to reflect current operating plans and baseline assumptions. He said the contractor recently completed this draft and DOE is currently reviewing it.

Jian-Shun reviewed the differences between system plan revisions 3 and 4. System Plan Rev 4 no longer includes a supplemental LAW treatment facility or supplemental pretreatment because second LAW is incorporated in place of these. The revision also delays WTP startup until December 2019, and second LAW is scheduled for 2023. Major accomplishments of System Plan Rev 4 include that SST retrievals will not limit mission duration and the SST retrieval sequence is a defined streamlining processes based on a tank farm approach.

Jian-Shun reviewed key findings for Rev 4, including that the mission duration is limited by WTP pretreatment. The amount of sodium going to pretreatment increased from Rev 3, since Rev 4 used an aluminum solubility correction that more accurately predicts sodium usage in the system. Rev 4 found that 40 percent more sodium has to go through pretreatment, which results in WTP's pretreatment controls determining mission duration. The third key finding in Rev4 is an increase in the number of HLW canisters, since remote-handled TRU (RH-TRU) will go to WTP.

System Plan Rev 4 includes risk-mitigation elements, and Jian-Shun said the mission end date can be improved by new DOE-ORP initiatives, including a feasibility study for a separate characterization blending facility. He said each tank at Savannah River National Laboratory (SRNL) has 40 inches of sludge. Hanford tanks may contain 200 inches of sludge, and there is a possibility that the baseline two mixer pumps may not be able to mix the waste in the feed staging DSTs to fully support waste feed delivery. This waste must be characterized and sampled to meet WTP waste acceptance criteria (WAC). He said ORP and WRPS are performing a feasibility study for building a separate waste feed characterization and blending facility, which would allow blending and thorough mixing to meet WTP WAC. A second DOE-ORP risk mitigation initiative is the potential to consolidate SSTs, which would involve using sound SSTs as interim storage or staging tanks before waste is transferred to DSTs. A third risk-mitigation strategy is the development of a sodium-management strategy, as extra sodium being sent to WTP will make WTP's pretreatment facility the bottleneck of the waste-treatment process. He said managing sodium efficiently will streamline the entire process. Other ongoing studies and development efforts would also help shorten the mission duration. These efforts include a glass formulation study to increase sodium loading in LAW glass and aluminum loading in HLW glass, starting the second LAW vitrification facility earlier, and optimizing retrieval sequencing to facilitate feed blending.

Jian-Shun reviewed a simplified flow diagram, which shows that the interim storage shipping facility will replace the Canister Storage Building (CSB). He then reviewed key features of Rev 3 and 4. System Plan Rev 4 has a funding profile from DOE Headquarters (DOE-HQ) that is implemented through a project-management baseline for the planning case and an unconstrained case, which has no explicit funding constraint. Rev 3 did not have explicit funding constraints. Highlights of Rev 4 are that C-Farm retrievals will be completed two years earlier and five additional retrievals will begin two years earlier. Treating CH-TRU waste includes the same timeframe, while retrieval of A/AX Farms will be completed earlier. In Rev 4, Jian-Shun said closing all of the SSTs will take two years longer because WTP pretreatment will limit the process rate.

Jian-Shun then reviewed initial observations of System Plan Rev 4. Positive impacts include improved SST retrieval rates, which will not limit the mission duration, and that the unconstrained case completed waste treatment in 2047. Negative impacts are that the mission duration is driven by WTP pretreatment capacity in the planning case, 40 percent more waste will be processed by the WTP pretreatment facility than System Plan Rev 3, exceeding its design capacity, larger supplemental treatment is needed, and sodium levels have increased due to a new aluminum solubility model in the WTP pretreatment facility. Jian-Shun said there are uncertainties in the system plan, which creates risk. He said Hanford's DST staging tanks will have much deeper sludge than SRNL, which has four mixer pumps, and the RPP baseline plans to install two mixer pumps. Jian-Shun said blending opportunities also need to be improved. For the unconstrained case, scoping runs suggest that the increased demand on pretreatment capacity due to the additional sodium and solids has to be managed by the project. Potential approaches include: a sodium management study, a glass formulation study to increase sodium incorporation into the LAW glass, a glass formulation study to increase aluminum incorporation into the HLW glass so less leaching is required, SST retrieval sequence optimization, a characterization/blending facility to offer better opportunity for feed blending, starting the second LAW vitrification facility earlier, a supplemental pretreatment facility, and other technical solutions.

### **Regulator Perspectives**

- Ed said Ecology is interested in reducing the risk from waste in tanks, which ultimately requires WTP to operate. He said the way to minimize risk is to ensure a short mission duration. In Ecology's view the way to do this is to ensure HLW vitrification remains the governing unit operation, since DOE has no plans to increase HLW glass production beyond increasing the capacity of second generation HLW melters. Ensuring other potential bottlenecks do not become the governing operation requires a robust retrieval system, and it is important that technology meets those expectations. The mission can also be limited by not providing enough supplemental treatment capacity. Lastly, he said it is important to ensure that pretreatment is sized adequately so it will not be the bottleneck and that this limiting factor does not drive mission duration.
- Ed said the value of systems modeling is that it gives decision-makers information to evaluate alternative scenarios. He expressed concern that cost information is only included with the constrained case and not the unconstrained case. He said the unconstrained case means moving LAW earlier and building in a sodium-mitigation strategy. DOE is generating cost estimates for the sodium-mitigation study, which includes probabilistic cost estimates to deal with uncertainties. He said it is possible

to estimate costs and expressed concern that Rev 4 does not allow for the ability to compare costs of the two scenarios to be evaluated. Jian-Shun said the contractor was instructed not to include cost estimates because management felt there was a huge uncertainty involved. He said DOE knows additional PT capacity has to be managed, whether it is an enhancement of the WRPS or WTP processes or supplemental PT. There is also an ongoing sodium-management program, which has an uncertain outcome. He said DOE hoped to reduce some uncertainties and planned to wait until next year to include it in the system plan.

- Ed said this system plan assumes farm-by-farm retrieval, which will reduce retrieval cost but could have an impact in terms of blending and efficiently sending feed to WTP. He said evaluating the tradeoffs, costs and benefits are reasons for a systems analysis. The systems plan uses the Hanford Tank Waste Operations Simulator (HTWOS) model, which assumes 17 percent aluminum oxide loading, while the sodium-management plan assumes aluminum oxide loading of 11 percent. Ed said use consistent assumption sets to allow better comparison of results.
- Jeff Lyon said one positive aspect of the System Plan Rev 4 is that tank retrievals are no longer the system's bottleneck. He noted that the hot start of WTP is shifting later, to the end of 2019.
- Jeff Lyon said the DST storage issue is a problem that is now being highlighted, and full mixer tanks create blending and mixing issues. He noted that the TWC may want further clarification on this. He said there is a time when retrievals will slow down considerably. He commented that the thickness of the wall canisters is also an issue.

### *Committee Discussion*

- Ken Gasper said one assumption in the plan was that the sound SSTs will be used for interim storage to allow treatment to move forward. He asked Ecology's position on this. Jeff said Ecology is looking at the legal issues of this, and its official position is to avoid putting waste in a non-compliant SST. Jian-Shun said there are technical and regulatory sides to this issue, and DOE realizes it would need Ecology's approval. The contractor is currently studying the feasibility. Ken said the Board supports looking at those alternatives in system planning. Jeff said if DOE is not going to build additional DSTs an alternative is needed to continue retrieval.
- Jeff Luke said he thinks the River and Plateau (RAP) committee needs to weigh in on the issue of DST space being a limiting factor for retrieval. He said public involvement will be important if DOE hopes to move waste from one SST to another.
- Pam asked whether the issue of secondary waste is included in System Plan Rev 4. Jian-Shun said most of the liquid effluents will be sent to ETF. All early LAW waste

will be pretreated and WTP will recycle technetium-99, so the majority of secondary waste will be incorporated into the glass. He said next year DOE will initiate an effort to study ETF capability and capacity. Billie said there is currently some ongoing work regarding secondary waste, which was presented in regard to the secondary waste roadmap. Jian-Shun said DOE plans to upgrade ETF and launch the facility's secondary treatment capability and capacity next year.

- Ken said the idea behind Board advice recommending DOE revise the system plan on an annual basis is to identify issues and potential constraints. He commended DOE for completing an unconstrained case as well as a planning case, and he encouraged DOE to put cost information in both cases.
- Rob said when Hanford was built workers were on the site 24 hours a day, and now that WTP is a bottleneck they are only working four days a week. He asked whether the unconstrained case considered adding overtime hours.
- Maynard asked whether there is a timeline for determining whether there are sound SSTs that could be used. Rob said the SST study group will not determine whether waste can be put back into the tanks, and it will only verify whether any waste can be removed. Jeff Lyon said DOE-ORP found in its study that SSTs are structurally sound, but they did not have data on leak integrity. He said the integrity panel meets at the end of April and will give recommendations on an improved integrity assessment process and program.
- Jeff Luke asked if the HAB has any extra funding available to help review the TC&WM EIS or look at the issue of SST integrity. Maynard said when the EIS was expected two years previously the Board asked DOE for extra funding for technical experts, which was deferred until the EIS came out.
- Harold said the system plan is an excellent piece of work that brings up important issues and identifies that if all the LAW is processed through supplemental treatment the SSTs will have to be pumped dry. He said salt cake is not readily re-dissolvable and it should be a focus for what will be completed in terms of supplemental treatment.
- Rob suggested that since the System Plan Rev 4 is a draft, the committee should review the document when it is finalized at the end of May before bringing it forward to a Board meeting. He expressed concern about the lack of definition in the unconstrained case and the absence of cost estimates for this case.
- System Plan Revision Four concerns, as captured on flip charts during the discussion:
  1. DST space
  2. WTP start-up date of 2019

3. Blending mixing of tank waste
4. Add cost figures for the unconstrained scenario
5. PT capability due to increase in sodium
6. Technical expertise assistance for reviewing System Plan Rev 4 and the TC&WM EIS for the Board. Is there additional funding available?

**Mobile Arm Retrieval System (MARS) (joint topic with the Health, Safety, & Environmental Protection Committee)**

Steve gave a presentation on the conceptual design of the Mobile Arm Retrieval System (MARS) technology and safety procedures that are in place for protecting workers. He said the tele-robotic arm of the system would be inserted through a 42-inch riser. He showed a picture of the full extension of a test arm, which would have an elbow-type of capability that would allow movement along two planes of motion.

Steve said MARS is being developed because of limited space in DSTs, and DOE hopes to have one technology to meet TPA retrieval goals. MARS would also provide a method of retrieving waste from assumed leakers. For DSTs, he said the use of sluicing has been effective, but having to re-dissolve materials requires more retrieval fluid. MARS will potentially allow removal using much less liquid than modified sluicing. Additionally, only one out of 12 large SSTs has met the TPA retrieval goal with modified sluicing.

Phase one of MARS testing is currently underway and is scheduled to be completed in June. Steve said eight discrete test areas were identified, and one main issue is how to manage the hoses coming into MARS so the system does not fail. The arm is made in Denmark and was shipped to the Hanford Site from Iowa. Steve said a piece of the arm is undergoing testing to determine its composition, and some of the seals on the hydraulic system will need to be replaced to make it more compatible with tank waste. The second phase of testing, which will include components that could go into a tank, will take place by the end of FY 2009. Steve said improvements to MARS will be made in the following months, and DOE's goal is to insert an arm into a C Farm tank by spring 2010.

Steve reviewed the design of the vacuum separator test tank component of MARS. This tank would have a telescoping arm rather than hoses, which would improve hose management issues. Steve said the problem with vacuum retrieval on the 200 series of tanks is that the vacuum was not capable of moving a great deal of waste. Steve said MARS would be capable of pulling waste horizontally into a vacuum tank then having an additional pump move it vertically. This method would be used in a leaker tank, while a sound tank might use a backstop instead. Steve said it is possible to vary the height of the

suction of the pump, and designs for the shielded box of the tank above ground are underway.

A detail of MARS arm movement shows that hydraulic piston assemblies are located on the sides of the carriage. Steve said the ability to control the arm's motion as it moves downward is important. The hydraulic pistons are kept in a fixed position and the piston arms can be pushed, which allows for positive control of the arm in both directions and a great deal of hydraulic capability. Steve said this provides a way to access the arm in the event of failure.

Steve said DOE still needs to reach a conclusion on whether MARS will be moved from tank to tank. The arm costs approximately \$50,000, and this will be more expensive when modifications are completed. He said it is not clear whether it will be cost-effective to undergo decontamination and decommissioning (D&D) on the MARS system after each tank retrieval versus deploying a new MARS system for each tank.

### **Regulator Perspectives**

- Jeff Lyon asked if MARS would also be part of the equipment that would need to be removed from the SSTs. Steve said removal would include all parts of the arm. Jeff said it is important to look at new technologies and Ecology is glad DOE is doing this. He expressed concern that cutting a hole in the tanks to install MARS could create an issue with the waste on the sides of tank walls. He said Ecology hopes to be able to extend and retract the system without submerging the arm.
- Jeff said one issue related to retrieving tank waste is particle size, and once it is reduced to a certain size it is difficult to remove from the tank. He said gravel-type waste still needs to be removed, and MARS does not solve that problem. Steve agreed.

### **Committee Discussion**

- Harold asked how much it would cost per unit to use MARS and abandon it. Steve said the system, including the arm and mast, costs between \$50,000 and \$100,000. He said the total project cost needs to be determined, but DOE hopes to have a retrieval tool that can complete all of the needed work. He said putting larger risers in the tanks is another issue. The first six tanks at C Farm have already been fitted with additional risers and pits, which complicates putting a larger riser into these tanks.



- Harold asked the weight of the arm when it is fully extended, and Steve said it is approximately 1,500 to 1,900 pounds. Jeff asked whether this assumes the system is full of waste. Steve said no, this is the weight of the crane itself.
- Dirk asked the cost of the risers. Steve said DOE authorized starting cost estimates and engineering on the riser part of the project during the past month and half, so these estimates are not yet complete. He said the combined cost of the riser and equipment will be approximately \$15 to \$20 million. Dirk asked if this project could potentially receive stimulus funding. Steve said it will not receive stimulus funding, but DOE did receive additional funding for retrieval this year.
- Maynard asked whether phase two of testing will provide an answer on whether MARS can be moved from tank to tank. Steve said he is not sure phase two will provide an answer to this, but DOE will test potential decontamination systems to be built into the design. He said the preference is to save money and move the system from tank to tank, but a way to decontaminate it that does not add liquid to the tank is needed.
- Dick asked what leverage is used for the system. Steve said MARS will not be anchored to the bottom of the tank. The entire system swivels and is on a 12-foot bearing, which will be attached to a four-foot bearing at the top of the mast. This will be rotated in an above-ground shielded box. A riser will extend down into the tank, and Steve said putting another bearing surface on the bottom of that riser would create a range of eight to 12 feet between the upper and lower bearings. He said DOE wants to ensure the system does not fail from fatigue. Pumps are also being considered, and Steve said a centrifugal type of pump that will not contribute to any type of oscillation will most likely be used.
- Dick asked whether the vacuum separator tank rotates. Steve said the tank will swivel with the mast, and the goal is to permanently attach the tank to the bottom to use as a counterweight.
- Pam inquired about the safety procedures in place for protection of workers. Steve said initial review meetings have taken place on this issue, and the shield box above grade will protect workers from any doses traveling inside the box. He said he does not yet know whether an end effector will be used or whether workers can replace a failed part, if needed. The tank will be put under active ventilation and DOE would continue with the same ventilation controls it currently uses, including stack monitoring and airspace monitoring. Steve said DOE would also continue to shield the hose-in-hose transfer system. Beyond these measures, he said he is not sure of unique hazards related to MARS.
- Ken asked where MARS testing will take place. Steve said DOE hopes to do phase two testing at the Cold Test Facility, but the superstructure needed to simulate the

system's above-grade structure is an issue. Ken asked whether safety procedures could be run during testing. Steve said the test facility will need to enable all of the processes that will be undertaken, including installation. Ken suggested that before the Cold Test Facility was available and height was needed, the balcony at the Fuels and Materials Examination Facility (FMEF) was used.

- Pam suggested including a presentation on MARS during the June HAB meeting and discussing this system at the June technology workshop.

### **Committee Business**

The committee approved the March meeting summary.

Potential future topics:

1. An issue manager meeting will be planned in May to discuss the TC&WM EIS and System Plan Rev 4. Possible dates for this are May 19 or 20. Bringing in outside technical experts for discussions on the EIS and System Plan Rev 4 was recommended.
2. Steve said PA workshops sponsored by DOE and Ecology are scheduled to take place every couple of months, and the agencies would like a HAB representative to participate. The first working session will take place May 5-7. The committee recommended Vince Panesko to serve as the HAB representative. Pam will contact him to determine his interest and availability.
3. WTP tour follow-up regarding heat-removal capacity and long-term planning for power to ensure electrical needs are met.
4. Presentations on System Plan Rev 4, MARS and the Sodium Management Plan to the full HAB. High level presentations on System Plan Rev 4 and Sodium Management Plan to full HAB. The committee recommended an hour and a half for both presentations.
5. Pam suggested a discussion of law 31-16, which relates to tank waste at SRNL and Idaho National Laboratory, and whether a similar law validating TPA requirements is needed in Washington State.
6. Al suggested a presentation on upgrading ETF and its potential to receive stimulus funding.

### **Handouts**

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

- Tank Closure and Waste Management EIS, Mary Beth Burandt, April 15, 2009.

- Na Technical Studies Plan and Initial System Case Evaluation, Jim Wicks, Langdon Holton and Julie Reddick, April 15, 2009.
- River Protection Project ORP-11242, System Plan, Revision 4, Draft: Briefing for the Hanford Advisory Board - Tank Waste Committee, Jian-Shun Shen, April 15, 2009.
- Mobile Arm Retrieval System (MARS) Design Briefing, Steve Pfaff, April 15, 2009.

---

**Attendees**

**HAB Members and Alternates**

Al Boldt	Norma Jean Germond	Jeff Luke
Rob Davis	Harold Heacock	Maynard Plahuta
Dirk Dunning	Mike Keizer	Gerry Pollet
Ken Gasper	Pam Larsen	Dick Smith

**Others**

Lori Gamache, DOE-ORP	Madeleine Brown, Ecology	Molly Jensen, EnviroIssues
Billie Mauss, DOE-ORP	Annette Carlson, Ecology	Cathy McCague, EnviroIssues
Steve Pfaff, DOE-ORP	Ed Fredenburg, Ecology	Stan Sobczyk, Nez Perce Tribe
	Jeff Lyon, Ecology	Langdon Holton, PNNL
		Henry Germond, Public
		Gail Laws, WDOH
		John Martell, WDOH (Phone)
		Mike Bernochoa, WRPS
		John Britton, WRPS
		Tom Crawford, WRPS
		Dave Rowland, Yakama Nation