

FINAL MEETING SUMMARY

**HANFORD ADVISORY BOARD
TANK WASTE COMMITTEE MEETING
August 6, 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 everyone and introductions were made. The committee approved the April meeting summary.

Larry said he thought this had been an outstanding year for the TWC committee. The committee issued three pieces of advice during the first part of the year. Since then, things have quieted down and the committee has been waiting for documents to be issued and during that time the issues managers have done some great work. Larry said he is hoping to have another productive year.

Cathy McCague conducted the committee leadership selection process. Cathy said nominations were received for Larry for chair of the committee, and for Mike Korenko and Rob Davis for vice chair. The committee confirmed Larry as chair of the committee for another year. Mike withdrew his nomination and Rob was confirmed as vice chair of the committee for the next year.

Secondary Waste Roadmap

Billie Mauss, Department of Energy – Office of River Protection (DOE-ORP), provided a presentation on the secondary waste roadmap. The objective of the roadmap is to outline a path to develop a baseline waste form for the treatment and disposal of secondary wastes associated with the treatment of tank waste at Hanford. Billie said she is working

to get the roadmap published under ORP, at which point they will move forward to determine how secondary waste will be qualified as a waste form.

Billie said the roadmap culminated from a workshop that was held last July. Billie said that experts from around the country participated in the workshop including staff from the Nuclear Regulatory Commission (NRC), as well as local representation from Ed Fredenburg and other representatives from the Washington State Department of Ecology (Ecology), and representation from the Hanford Advisory Board (HAB or Board) from Dirk Dunning and Larry Lockrem. Billie said the workshop produced good information, some of which is starting to be implemented.

Billie said the stops and key elements on the roadmap were developed based on the regulatory requirements, waste composition and process to develop and qualify waste forms. Billie said they also laid out the requirements for screening methodologies because it is likely they will end up with a variety of potential waste forms. Once several candidates have been identified, they can move forward and develop a waste form to be validated.

Billie said the project received American Reinvestment and Recovery Act (ARRA) funds that will help expedite the work; the work was originally funded by Environmental Management (EM) – 21. Billie said they are utilizing the expertise within the Pacific Northwest National Laboratory (PNNL) to perform the waste form development. Billie said headquarters is helping as well with qualifying tests and managing the waste form. DOE-ORP is working on getting funding under the Washington River Protection Solutions (WRPS) contract to develop the waste form in the effluent treatment facility (ETF). Billie said work is underway and activities have included: preliminary screening, a small EM funded project to look at low temperature immobilization, materials evaluation at ETF, steam reforming, and ongoing work by a group of Vanderbilt researchers who are considering different materials of cementitious barriers.

Billie said the roadmap lays out what DOE-ORP needs to do on the programmatic and regulatory side to address secondary waste risks. The roadmap also outlines the department's technology needs. The programmatic/regulatory needs include: selecting and deploying a tank waste supplemental treatment technology, providing treatment capabilities for secondary waste streams from tank waste treatment, and developing consensus on secondary waste for acceptance. The technology needs include: defining secondary waste composition ranges and uncertainties, identifying and developing waste forms for secondary waste immobilization and disposal, and developing test methods to characterize secondary waste form performance.

Regulator Perspectives

- Ed Fredenburg, Ecology, said Ecology is concerned that DOE-ORP would not start any upgrades to ETF or other capital projects to treat secondary waste soon enough to ensure project completion by the time WTP starts in 2019. Since DOE-ORP usually requires at least 7 years for a capital project (justification of mission need to approval

to operate) work on waste form development will need to be completed in the next couple years. Ed said he would like to see a schedule to better understand how this fits into the timeline. Billie said DOE-ORP's permit modification says they have to define waste form by 2015, but they would like to do that sooner.

- Ed reminded participants that the Secondary Waste Technology Roadmap developed following the workshop in July 2008 identified a need to establish tentative regulatory criteria prior to making final decisions on waste forms, e.g., agreement on the point of compliance. Ed said he was also unsure how this will be impacted by the Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS). Ed said that Ecology and ORP need to come to an understanding about the acceptable regulatory limits so DOE-ORP can proceed with the waste form screening and development. Billie said DOE has started that dialogue internally with the Richland Operations Office (RL) to make sure data points are coming together at the right time. Billie said she will plan on bringing Ecology into those discussions over the next few months.

Committee Discussion

- Paige Knight asked what is being studied in regards to cementitious waste forms. Billie said cementitious waste forms is one of many options being looked at and is headed by a working group in Savannah River.
- Larry asked how much money will be available to support the technologies. Billie said EM-21 has been supportive on these long range plans and gave ORP the support and funding to start the roadmap. Billie said they will have some money from EM-21 that will carry over, but the rest will be all ARRA funding. Billie said she did not have information on the specific dollar amounts. Billie said she did not think EM-21 would fund anything beyond the cementitious waste form committee. Billie said ORP received \$250,000 from EM-21 for this task and Billie is working to make sure they are not redundant in funding, but covered for the duration. She thought they would be better funded under ARRA.
- Mike said it seems like one of the technical challenges is keeping the technetium contained and stable. Mike asked if ORP considered a pretreatment option to extract the technetium before the waste form stabilization. Billie said ETF does have that capability, but she thought that ORP was asked to look at a resin column so it would put the technetium in a monolithic waste form. Mike suggested that backwashing with nitrate would allow them to concentrate and dispose of the technetium separately. Jim Duncan, WRPS, said you have to be extremely precise on the chemistry to backwash technetium and it is not easy. Jim said Purolite is the best option for this and when he tried it, it absorbed the strontium. Mike said he would follow up with Jim about this later. Billie said they are gathering all the reference reports on this and will look into that.
- Al Boldt said there is a deficiency in the system engineering that is causing this problem and thought DOE should go back and identify the source of the problem in the WTP. Al suggested installing an evaporator to lower the contaminants of interest to ETF. Al thought it would be less costly to address this issue at WTP. Al said ORP

needs to define why the iodine and technetium are coming through and what changes could be made in WTP, or additions in the nearby vicinity, instead of building a complex at ETF. Larry said there were side conversations about this at the workshop and it was not captured in the roadmap. Al reiterated that identifying the source issues should be another box on the roadmap diagram. Mike said the Board gave advice to DOE to form a group and look into this issue in December 2008 and have not heard anything back. Dick Smith said ORP is moving forward with this approach because it does not affect WTP. Al said the effect to WTP would not change the design or impact the schedule.

- Pam Larsen said the pretreatment engineering platform (PEP) did a good job of looking at separation of low/high and solid/liquid waste. Pam said Congress has been critical of WTP for not doing more testing and there is a concern about blending. There was a request made to look at extending the opportunities at PEP to do some additional testing. Larry said PEP is going to officially transfer to WRPS in November. Larry thought that when it becomes part of tank farms the possibility of using it for more testing might be open. Billie confirmed that they are looking at PEP for technology scope dollars and are planning to do additional testing, but she was not sure about hot testing. Pam clarified that it would not just be hot testing but also blending.
- Pam said the roadmap flowchart does not define which secondary waste forms are being studied. Pam said she assumes that they will look at technetium 99, iodine and aluminum. Billie said there is a report due that defines the secondary waste stream by June 2015. She said they will talk with Ecology about bringing that date up. Billie said until they actually run the plan, they only have the ranges from the models to work with. Billie said they were looking at interim pretreatment and could not recycle to get an indication of what that would be like. Pam asked if aluminum is part of the study. Billie said it is not part of secondary waste because it goes back into the glass form.
- Ed said it is important to understand that based on the current flow sheet, as long as there is no early low activity waste (LAW) treatment, less than one percent of the technetium inventory from tanks goes to secondary waste which is less than about 300 curies. Ed said the main effect of diverting technetium from low level glass to ETF is that you end up with more disposed of onsite in a low activity glass. Billie said the bulk vitrification process had a recycle stream, but it is captured in scrubbers. Ed said some of it was volatilized, but most was captured in scrubbers and only about one percent goes into the secondary waste stream. Dick said he remembered seeing a presentation that showed eight percent of the waste was unaccounted for in the bulk vitrification process. Ed said the workshop last summer looked at early LAW which sends a lot of material to secondary waste. Billie said they can show this to the committee once they have the flow sheet.
- Dick said he was not enthusiastic about the idea of running hot material through PEP because it is not shielded. Dick questioned why the document was delayed from being publicly released. Dick added that when it was issued, the public was given a short review period. Billie said they ran into some contractual issues and apologized for the delay.

- Dirk Dunning said during the workshop the scientists were focused on the technical issues and the roadmap, so questions about dealing with waste before it gets to ETF was not a part of the discussion. Dirk said from a regulatory approach, ORP assumed the maximum contamination to groundwater allowable, and then used a model to calculate the release rate. Dirk said all of the models have uncertainties, and if they are wrong in the assumptions it could result in contamination to the groundwater above the regulated level. Dirk expressed concern with this assumption and suggested instead, looking at the best approach and best waste form possible. Dirk said ORP is trying to save in the short term, and will end up spending more because they are optimizing too soon. Dirk said the high level waste (HLW) is an issue that needs to be discussed including how you define it and to keep waste out of the environment.
- Pam said now that Yucca Mountain is not in the picture, the question about HLW should become more relevant than it was before. Pam asked what the mechanism is for exploring this issue. Jeff Luke thought this was an issue the committee should raise. Billie recommended someone from DOE-headquarters to discuss this. Mike said the Board's advice in December includes details about the consequences of the loss of the repository and effect to the waste criteria at Hanford.
- Rob Davis said tank infrastructure is also part of the secondary waste cost. The best air cleanup system will be at WTP and it would make sense to incorporate a system there instead of building new infrastructure at ETF. Rob said WTP is 50 percent complete this month. Rob said at a recent HAB meeting there was a discussion of asking DOE to look at recycling. Rob said the roadmap should ask the question if there is any possibility of recycle. Larry said when this issue was brought up before the regulatory process caused a problem. Larry said it was unclear if the barriers have gotten stronger or weaker with the new administration. Rob said the Board should ask DOE to work through those barriers. Rob said he would like to see a box on the roadmap to show that consideration is being given to this. Billie said the only recycle they have looked at is evaporating condensate and using it in recycle.
- Rob asked if the secondary waste final disposal is onsite. Billie said it is. Rob asked why the point of compliance is not based on where it is being stored. Ed said his comment earlier was about tank farms and how much waste will be in tanks and how you measure long-term concentrations in groundwater at the boundary of tanks, or downstream. Ed said these conversations are still happening but he is not involved. Billie said they will know more when they look at an overall performance assessment for the Central Plateau. Rob asked if the point of compliance is on the package, or disposal facility. Ed said the disposal. Rob thought that if a new waste package is developed, there needs to be enough time and funds for full scale testing. Rob said this is why there are problems at WTP, and ETF became necessary because not enough testing was done.
- Al said the TC&WM EIS is expected at the end of the year, and this document should recognize the data in the EIS. Al said if there are different quantities, composition and waste performances in the two documents, it will need an explanation. Al suggested that the document acknowledge and explain the differences, so people do not question it. Billie said if the EIS shows an issue with secondary waste, this would be a way to

mitigate that issue; the documents are complimentary. Larry reiterated the need to tie the two together.

- Dirk, Mike and Harold Heacock volunteered to be issue managers on this topic with Dirk as the lead.

Technetium Waste

Billie said the Supplemental Treatment Risk Assessment from 2003 identified potential risk drivers from technetium 99 and iodine 129. Billie said the work from 2005 on low temperature immobilization produced good information for dealing with these constituents. In 2008, DOE issued three contracts to look at waste loading, leaching and the compressive strength of different waste forms. The contracts included Mississippi State University for testing on Alkali Aluminosilicate Hydroceramic Cement, CH2M Hill for testing on Phosphate Bonded Ceramic, and Vitreous State Laboratory for testing on Alkali Aluminosilicate Geopolymer. Billie said the results were varied; the cement waste form did not pass the compressive strength tests, the ceramic waste form passed all of the tests except project consistency testing and the polymer waste form passed the strength tests but broke apart during the leaching tests. Billie said these were small tests; they spent less than \$100,000 on each.

Billie said ETF did some tests in 2008 as well to look into a different waste streams to deal with secondary waste. The testing looked at a mechanism of sequestering technetium in a waste form by changing it from a mobile constituent to bind with another material. The tests looked at apatite getters, reductants, and stabilization. Billie said the materials were put into a cementitious waste form for the tests. The first test evaluated different pH levels before the material was put into the cementations form. At pH of 5-6 the ion exchange resins were the only ones that performed. When tested at a higher pH, the apatite performed well and so did the ion exchange. The getter materials and the reductants were put into a cementitious waste form and cured for 28 days. Then they conducted leaching tests (TCLP and ANSI). The first test showed ion exchange and apatite performed well. Billie said the other test was done in water, and in this case only the apatite performed well. Billie said there was some retention in using getter materials but the resins and apatite did the work in the high leach test.

Billie said ORP has money from EM-21 but the funding is moving back to ARRA. Future work involves an ongoing literature search which provides examples to learn from. This will continue through the end of October, afterwards they hope to start testing. DOE-ORP would like to do additional waste form testing to understand the getters and reducing materials to see how they work in a matrix of the waste form. Billie said they plan to test a range of compositions and will look at extending the testing period beyond leaching. The last part of the study will be evaluating failure modes. Billie said they plan to hold a workshop in January on this work. Billie said DOE's new permit modification requires that a treatment be identified for the mixed waste streams by December 2015. DOE would like to do that sooner. Billie said ETF will need an addition if they put in immobilization equipment and under Resource Conservation and Recovery Act (RCRA) the facility would require a permit modification.

Kris Colosi, WRPS, said they plan to do three or four screening tests and would like to get to a point where they do long-term testing similar to glass. Kris said this work is part of phase one and they still need to evaluate phase two.

Regulator Perspectives

- Ed asked if phase two is intended to be part of the waste form screening shown in the schedule from Billie's first presentation. Kris said it was meant to support long-term testing and they are setting up the work to be a long term program. Ed said he was encouraged that the work is starting even though it has been twelve months since the workshop. Ed said his concern is with how this work is planned out and fits into supporting decisions for capital projects that need to be completed by a certain date. Kris said this work will provide input into a conceptual design. Ed said Ecology would like to see the overall schedule and how the work supports the activities in the capital projects. Kris explained that the work is lined up so whatever waste forms are selected will go through go/no-go screening process that will influence the design. Ed reiterated that the objective should be to not delay WTP.

Committee Discussion

- Rob said there have been technical issues with developing glass and the waste form even though the research was based on the best literature studies. Rob said it was clear from that process that until the testing was completed no one knew if the processes would work. Rob thought that large scale testing is necessary to validate any waste form. Kris said the decision to upgrade a facility for testing will depend on the technology and how mature it is. Kris said the technology readiness process includes scale testing. Billie clarified that the technology readiness level must be at a ten scale plan. Larry said it was demonstrated in the mission acceleration initiative that when you scale testing up to 3x3 from bench scale or lab scale testing there were many failures.
- Al said the work on a waste form needs to retain the iodine 129 in addition to the technetium. Al said the iodine should be included in the testing now instead of going back later to add it. Al also said the conclusions infer that the results are good. Al said in the previous EIS the assumption stated a leach of 12 but the calculations were at 14 which barely met the requirement. Al thought it was too soon to say 12 is good and they may need to do better than 14. Jim said this work is a scoping study, it gave them some good data, but they have a lot more work to confirm it and see if it will hold up.
- Mike clarified that the number Al is talking about is a number for stabilization, and if you were looking at extraction it would be different. Mike said that may be another research branch the group should consider. Mike also said that iodine can be transferred to a medical isotope through transmutation, which the medical community currently does. Mike recommended that someone should look at the real risk of the contaminants and possibly take iodine 129 off the list of concern. Mike suggested looking into a regulatory change to save money from having to box-in iodine. Billie said Hanford's iodine 129 inventory is all over the map. Dirk said it is the ratio of

iodine 129 that makes it of concern. Al added that when iodine 129 is in the groundwater it would lead to exposure every day whereas the medical community is using it on patients once or twice a year. Mike felt the regulators need to decide if this is of concern or not.

- Dirk asked how you assure a waste form is stable for geologic time. Dirk said for every increase 10 degrees Celsius, the aging is accelerated by a factor of two. Dirk said the study is limited to 32 times age testing. Dirk was not sure if 1000 years was a long enough time period to look at. Also, Dirk said there are other things in groundwater like organics that might change how the materials age. Dirk said the tests were striving for a certain pH but that does not represent real conditions. Dirk said one of the tests showed the material fell apart in water, but did not consider other failures. Dirk said technetium and iodine are mobile in soil and there is a time lag between surface and groundwater, but there is no dilution. Dirk said the age testing can be used as a guide but after 100-500 years through the soil, the contamination will eventually reach groundwater at the same concentrations.
- Dick said the leach testing is done on clad materials and he is concerned that there are no tests of actual HLW glass that shows the molten ionic salt is not present in glass canisters. Dick said if container fails then the contaminants will all get out. Billie said part of that issue is mitigated by the melter, it mixes in the melter and the material absorbs that because the range at which salt is molten will be surpassed in the melter. Billie said in the melter will pour off the bottom which showed the canisters did not have any molten salt. Dirk asked to see the reports that show this. Billie said she would need to contact Savannah River to get the reports. Mike did not think bottom drawing would make a difference because the solidification is a sweep. Mike remarked that WTP staff said they could do a double melt to solve this issue, but operationally that will not work. Mike said the sulfite sweep is still an issue and he agreed with Dick that the technetium will not be nicely mixed in the glass.
- Rob said the 28 day cure time is based on cement, and the tests were not done with cement. Rob said it took scientists 20 years to figure out the concentrations for the cure time and the plan does not include testing to determine if the 28 days is the real cure time. Rob said there are some hydrates that take years to cure and this should be looked at. Jim agreed.
- Mike and Dirk were identified as the issue managers on this topic with Mike as the lead issue manager.

C Farm Tank Performance Assessment

Vince Panesko, issue manager for the C Farm Tank Performance Assessment, provided an overview of the work. Vince reviewed the DOE requirements to do performance assessments. He said waste at Hanford was supposed to meet a performance assessment with a certain dose that was deemed acceptable to the public. If the dose goes above a certain number and exceeds the performance objectives, i.e. the dose is too high to the public, DOE will have to make the waste form tighter/stronger, harden the facility, or come up with another alternative. Vince said at Hanford, various waste forms are under

different programs and many were above the acceptable dose to public. DOE has been struggling with this as they started a performance assessment on C-Farm. Vince said he attended a recent workshop on this topic and came away with three questions for the committee to consider.

Vince said two other performance assessments are of interest; the first one looked at tank farms with single shell tanks (SST). The second one was a composite which covered the whole Hanford Site. Vince said he would like to know where that composite is, and whether it has been put on the back burner until the EIS is finished. Vince said he thinks the committee should ask for a presentation on what has been done on C-Farm in terms its contribution to the composite performance assessment. Also of interest is the contribution of C-Farm to the assessment 2006 which evaluated a number of impacts. The work revealed a larger concern about the contamination that is outside the tanks. Vince thought the committee should also ask DOE why they are doing another assessment when one already seems to have been done for SST.

Vince said his second question is why the cribs and burial grounds that are near C-Farm do not require a performance assessment under Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Vince said the process of evaluation seems inconsistent. Vince said Executive Order 435 required DOE to look at CERCLA and document where CERCLA does not meet the requirements of 435.1. Vince said he could not find this documentation. Vince thought it was important for the committee to be educated on this.

Vince said his third question originated during the workshop when they discussed what happens if the tank closure actions cannot remove all of the waste from the tanks. At C-Farm, small tanks have been closed but they have not been able to get all material out. The EIS has assumed 360 cubic feet of material will be left in the larger tanks. Vince said that is equivalent to 2600 gallons which would cover ¼ inch across the bottom of a tank. The workshop discussed that the numbers for retrieved tanks do not match the assumptions in the EIS. The retrieved tanks have shown that sand and gravel remains on the floor which creates pools and pockets of residue greater than 360 cubic feet. Vince said the performance assessment will use the data from the tanks that have numbers for retrieval. Vince asked that DOE explain why the performance assessment is being done now when some numbers are based on actual retrieval and some are assumptions. Vince thought it would make sense to wait until all of the numbers are based on retrieval. Vince said the committee needs to understand the process better and how this connects with other activities in the 200 Area.

Susan Eberlein, WRPS, provided an update on the C-Farm performance assessment. Susan said the performance assessment process is meant to develop inputs, assumptions and frameworks for doing modeling. Susan said they have ten working sessions scheduled with the technical team, stakeholders and regulators. Susan said she wants to make sure the product addresses everyone's concerns. Susan said she would like to address the questions Vince raised.

First question: How does the work on C-Farm relate to the other performance assessment done on SST? Susan said they are focusing on sources coming from waste management Area C. Susan confirmed there was a combined performance assessment for the SST system done previously but said they need both assessments in order to understand the full picture. Susan said the SST performance assessment that was done for the Hanford Site a couple years ago used a modeling approach based on knowledge at the time. Susan said questions were raised about that approach and the regulators and stakeholders did not have an opportunity to provide input into how that work was done. In order to produce a product regarding closure decisions, DOE felt it was appropriate to involve everyone for input so when the modeling is done this time, the right assumptions have been considered. Susan said the work they are doing now is a step beyond what was done in the previous SST assessment.

Second question: Why is a performance assessment required for C-Farm and not near-by trenches and cribs? Susan said she cannot answer that question. She said the driver for the performance assessment was the Tri-Party Agreement and DOE 435.1 Order. Susan said it will not be possible to retrieve all of the waste in the tank farms and a determination will have to be made on how much waste is incidental to processing. Susan said they will have to show the risk remaining from that waste is acceptable, and the performance assessment is part of that. This is a RCRA disposal facility so there may be regulatory requirements that are different. Susan said she hopes to be able to complete one cohesive analysis of the risk that will show the overall picture. Susan said they want to evaluate several different options for retrieval to help the regulators make informed decisions about the cleanup.

Third question: What happens if the tank closure actions cannot remove the amount of waste assumed in the EIS? Susan agreed this is an important question. She said if you talk about volumes of waste only, you are not addressing the risk and you need to look at concentrations as well to understand the inventory. Susan said the EIS was developed prior to retrieval and had to make assumptions about the end states. Now that some retrieval has been done, there is a better idea of what will remain. Susan said the performance assessment will allow them to evaluate the risk, and whether the risk is bounded by the assumptions in the EIS, or if the retrieval attempts were insufficient. Susan said the contribution of risk from the soil contamination is worse, and they will have to look at all contributions to address the risk in order to support closure of the waste management area.

Susan said they are conducting the performance assessment now in order to understand the relative concentration of risk to help focus on how to best reduce the risk. Susan said the assumptions on how to model contamination through the soil to groundwater is not something everyone agrees on. Susan said discussions need to continue on this so a solution can be developed. Susan said if everyone can agree on the guidelines and assumptions in the plan and jointly develop a process, then they can make good progress prior to the completion of retrieval. Susan said if there is not agreement before the end of retrieval, it will take another couple years to resolve. Susan said by starting this process

now, they are forcing important discussion about what should be considered and what closure means.

Susan said they have scheduled ten workshops leading up to a model run. Susan said they are learning items at each workshop that may end up adding to the schedule or changing the order between items. Susan said they have requested continued participation from all of the organizations involved. Vince will continue to participate for the HAB. If there are other committee members with a particular interest or expertise in a certain topic, Susan said she would be happy to have others involved too. Susan said they have been producing the technical material for each workshop a month prior so everyone has time for review and questions before the workshop which makes the working sessions more productive.

Regulator Perspectives

- Beth Rochette, Ecology, said she is the lead from Ecology on SST performance assessment. Beth said Ecology submitted comments on the document in 2006. Beth said Ecology has found this process helpful. She said the NRC and stakeholder involvement is going well and they are hopeful there will be a good product.

Committee Discussion

- Mike said if the tanks could be separated from the spills underneath, it would be clear that the priority would be the contamination under the tanks. Mike said since the tanks are on top of the contamination, focus centers on the tanks and it is taking a long time for DOE to decide how to deal with them. During that time, contamination under the tanks is moving. Mike encouraged DOE to explore alternative systematic approaches such as going through the tanks to examine contamination. Mike applauds the performance assessment as a good system approach meanwhile as money goes towards cleaning the risk is spreading. Susan said there are not many soil remediation options available since the leaks are 150 or more feet deep. Susan said there is technology in development but not many options available now. Larry asked about the work to develop an apatite barrier. Susan said the effectiveness of the apatite barrier is being evaluated and if they can demonstrate the effectiveness, it could be a good option. Susan said that technology is not being used in tank farms, but they have used some surface barriers to prevent the contamination in the ground from spreading to the groundwater from water intrusion.
- Pam asked if the soil contamination is RCRA or CERCLA waste. Susan said it is part of the RCRA treatment, storage and disposal facility, and it also needs to be closed to meet CERCLA standards. Pam asked if they will be defining points of compliance as part of this process. Susan said they would not be defining points of compliance but providing information for regulators to determine the right point of compliance for the area.
- Pam said if the tank waste is RCRA waste then DOE is required to clean all of it up. Pam said CERCLA allows you to define what a reasonable amount to clean up is, and the TPA allows some waste to be left in tanks but that is inconsistent with RCRA.

Pam said Congress put language in a bill to allow waste incidental to reprocessing through RCRA in order to address this issue. However, Senator Cantwell took Hanford out of that legislation. Pam said Hanford needs to come up with a solution so an end state can be defined. She said during a recent visit, Dr. Triay, DOE Assistant Energy Secretary, encouraged stakeholders to come up with a solution. Pam said Dr. Triay asked Ecology to draft something they thought would be acceptable, which apparently they have done. Pam suggested a future committee topic be an Ecology presentation on what they recommended. Pam said it is important to understand there is a clear end point of the retrieval process. Susan said the performance assessment should be a tool to facilitate the waste incidental to reprocessing (WIR) process. There are other RCRA concerns that are not directly associated with WIR. Pam suggested the committee ask for a briefing on how to resolve the WIR issue.

- Jeff asked Pam if she thought Ecology has already identified a solution. Pam said she believes they have a proposal to submit to Congress. Jeff said he is fine with asking Ecology for a briefing on their proposal. Pam said she would also like to learn more about what has happened with the other states and develop some lessons learned on this issue. Susan said the 3116 process was used at Savannah to have waste reclassified.
- Dirk said the NRC's involvement comes in two paths, 435.1 or 3116. The processes are similar but different in timing. Dirk said the other sites decided to merge them as if both apply so NRC is being involved early. Dirk said at Idaho and Savannah River there are no releases to the soil and the purpose of regulation was to allow residual waste in tanks. Dirk said they discussed in depth at the workshop how much waste can be left in the pipelines and in the tanks, which Dirk felt is irrelevant because the tanks have to come out. Dirk mentioned if you do not start by saying you are going to dig up the tanks, then you have not addressed the issue. Jeff asked if Dirk was opposed to supporting Pam's request. Dirk said he is more interested in discussing getting the contamination out of the ground rather than talking about what can be left in the tanks.
- Dirk also said the transport issue will be key. Dirk said Susan mentioned that everyone needs to agree on a transport model, but people are just now starting to understand it and there are new models coming out which will lead to more codes. Dirk said he is not sure the proposed schedule is achievable because the issue is not fully understood yet.
- Rob thought the committee needs to understand the difference between 435.1 requirements and WIR. Rob agreed the legal issues need to be handled up front. He also said it would be nice to see a roadmap so he can better understand the big picture approach and how this work integrates into the long term stewardship plans. Susan asked if Rob was asking for a timeline of this waste management area, or all tank farms. Rob said he wanted to use this one as an example of the first one.
- Jeff reminded the committee that the EIS is one of the public's tools to express concerns about the waste under the tanks. Harold said he is concerned that from the public perspective the Board has been promoting the EIS as the answer. This performance assessment may or may not be consistent with the EIS which will

require explanations to resolve the issues. Susan said it is assumed that the performance assessment will have to fall under confines of the EIS and there are EIS team members attending the workshops. Susan said the difference is that they are looking in detail at a small area, and the EIS team is looking broadly at a large area. Harold said the EIS made assumptions about all of the areas and they need to be consistent. Dick asked if they are using the same models as the EIS. Susan said they are not using the same numeric codes because they are describing smaller elements but the numbers will be bound by the models the EIS used.

- Larry said if any committee members want to attend a working group session they should coordinate with Lori Gamache, DOE-ORP. Lori suggested that if committee members want to participate, they do so through Vince.

Fiscal Year (FY) 2011 Budget/Cleanup Priorities Workshop (joint topic with BCC)

Gerry Pollet said during the recent budget workshop it became clear that the Board needed to issue advice that says the budget submitted from each field office needs to include funding to be compliant with the milestones as they currently exist, not as they may be changed in the negotiated TPA. Gerry said the FY 2011 budget did not include all of the work the Board had hoped to see, and ORP did not provide any over target budget items.

Gerry said he was concerned that the integrated priorities list (IPL) had tank farms operations at \$239 million without any additional details on the funding break down. The proposed advice requests additional details on this break down. The second page of the advice attempts to articulate what Harold identified during the workshop as a lack of priority and direction in ORP's request. The roadmap for ORP is not clear and that is a contributor to the fact that they have not identified what they would do if additional money was available. Out of the money requested, \$50 million was for technology development but no funds were identified for speeding up retrieval, exploring early LAW, or supplemental treatment. Gerry said there is a recurring theme in the draft advice about a lack of characterization which is carried over from last budget advice. Gerry said the work cannot start in 2012 if the characterization work is not done now. Gerry said he tried to incorporate the comments he received from the State of Oregon in the advice as well. He did, however, leave one item out about Oregon's specific concerns regarding transporting waste to Waste Isolation Pilot Plant (WIPP).

Gerry said he recently received a great PowerPoint presentation on research that was done to identify how much buried transuranic (TRU) waste is in the soil at Hanford. Gerry said he will share this at the September Board meeting. He said it is an astonishing quantity, 150,000 cubic meters is estimated in the soil.

Committee Discussion

- Keith asked whether the waste in the Purex tunnels is classified as TRU. Jeff asked if this is related to the budget advice. Keith thought it might apply to the budget advice if there is no clear path and budget to handle it, but thought it would not be an issue

for this year's advice. Pam said the Purex tunnels are in the Central Plateau contract scope of work.

- Pam asked if the advice should be more specific about inadequate funding for characterization of waste sites on the first page. Dick thought the specifics should be in the advice section, not in the introduction. Jeff agreed with Dick.
- Jeff questioned the last advice bullet that says "ORP should conduct pilot scale testing of processing of hot waste." Jeff asked if this was meant to suggest using an existing facility somewhere in the country, or if it was suggesting DOE should build a new facility to test waste. Jeff said if it is meant to suggest building a new facility, he would not support the advice. Gerry thought it was meant to suggest that DOE use PEP for hot testing. Pam said they discussed the need to test blending at the workshop and the possibility of PEP being shielded and used to test the pretreatment technology. Jeff thought that the two sentences under that piece of advice were separate and should be broken into two items. He also suggested correcting the second sentence to make it less vague. Larry said contractually, PEP will be transferred to WRPS in November and will be moved somewhere onsite. Dick asked if moving PEP makes any sense because of the expense. Stacey Charboneau confirmed that PEP transfers in November. She said the phase one testing was under Bechtel and will be completed shortly. Then PEP transitions to WRPS and at some point PEP will be moved between tanks and WTP for phase two testing of ultrafiltration capacity for pretreatment. Stacey said it certainly could be used for other testing on simulants.
- Dick asked why PEP cannot be left where it is today. Stacey said having it maintained by PNNL will be expensive. Stacey said they are currently doing mixing studies to better understand if they need a waste blending facility. DOE conducted a mixing workshop and had experts help scope the studies to better understand if they can effectively mix in one million gallons in a tank, and if they can make the mixture representative of the samples of waste that will go to WTP. The current configuration uses two mixing tanks, and they need to know if that is enough or whether another blending facility is needed. Dick asked if the mixing is to achieve a representative batch in the tank or a level of uniformity across tank farms. Stacey said it was just so they feel confident the sample from a tank is representative of what is in that tank. They may need to look into sampling layers or how to best batch the tanks if they cannot get a consistent mixture.
- Mike asked if DOE has the authority to keep PEP in the same place and bring the other contractor there. Stacey said they anticipate they will need the facility for a longtime and cannot take PNNL's facility. The facility was not built using government funding, is it privately owned.
- Al suggested revising the sentence that Jeff was confused about to say: "ORP should continue to conduct pilot scale testing and processing of simulants or real waste in existing facilities." Stacey said they are planning to conduct hot testing in a lab with real tank waste, but they do not have plans to do hot testing at PEP. Al said the advice is suggesting that pilot scale testing is needed, not lab tests. Jeff said his concern was that the sentence indicated building a new facility and he wanted to make sure this

committee was not advising that. Pam said she wanted to get input from Ken Gasper on this item because he was the person that brought it up during the workshop. Pam suggesting tabling this item until they are able to get feedback from Ken. Larry suggested adding bench scale and/or pilot scale to clarify the committee's intentions as well.

- Harold said DOE paid for the pilot plant and DOE will need a pilot plant to support operations to test formulations against their processes. Harold said that without a hot facility onsite, DOE will be in trouble. Harold still felt the advice should recommend moving the pilot plant and using it as a hot facility. Keith asked if the facility could be used for hot testing. Stacey said it could not be as it is currently designed. Stacey said she understood the value of the hot testing, but was not sure the facility could be used that way. Pam said she would work on getting Ken's input and get back to the committee.
- Cathy suggested that committee members send any other comments or edits to the advice to Gerry or Harold.
- The committee decided that they support the advice pending resolution of the last piece of advice that Pam will work to resolve.
- Gerry suggested adding to advice number five that ORP should work with Ecology on how to allocate the funding.

Research and Technology Development Funding (joint topic with BCC)

Stacey said in 2007, the National Academy of Science (NAS) performed a review to help EM put together a technology roadmap to identify gaps in knowledge in waste processing. Stacey said the new Energy Secretary has a commitment to developing new technologies and provided additional funding to support this effort. DOE Office of Management and Business (OMB) put a portion of the funds allocated for technology in the tank farms budget. Stacey said the EM-20 budget is constant from 2010-2012 at \$105 million per year. The EM-21 budget is also constant at \$68 million per year; ORP is receiving \$50 million per year from EM-21 for technology development. Stacey said ORP has been working on identifying the needs at tank farms and around the whole complex for addressing tank waste.

Stacey said a high priority for ORP is identifying the needs in waste processing. Stacey said a big question is how to remove the last ten percent of waste out of the tanks. She said they have to be prepared to do that with a technology they are comfortable with. Stacey said DOE is considering a number of approaches to address this issue including using an enhanced chemical cleaning to minimize constituents in the waste and avoid adding any additional sodium to the process. Stacey said ORP is also interested in studying the possibility of increasing the waste loading in glass to meet the schedule requirements of EM's high level waste programs. DOE-ORP has funded Vitreous State Laboratory (VSL) to conduct continued glass studies to see if they can develop good quality glass that meets criteria but has higher contaminant concentrations. The glass studies will help the agency understand what is going into the disposal facilities onsite

and how to meet the performance assessment criteria while minimizing the amount of glass. Stacey said if they can find ways to minimize the glass then they can see substantial cost savings in shortening the mission duration.

Stacey said ORP has identified five priority areas for technology development and deployment (TDD) funds: retrieval and closure, improved vitrification, in-tank/near-tank pretreatment, tank waste impact on structural integrity, and other activities. Stacey said ORP will do closure demonstrations in 2011 that will explore things like grout capabilities to help develop the closure plan. Sampling is another area ORP is planning to apply TDD funds. She said ORP has talked about the homogeneity of the tanks and how sampling will help the department better understand what is left in those tanks to enable risk based decisions for closure.

Stacey said DOE-ORP is applying TDD funds to go after strategies for optimization of tank waste. There are two kinds of projects they are looking at, those which are implementable in the near term with technology advancements (ex. enhanced glass testing), and transformational changes that can happen over the long term. For the items that are implementable in the near term, they are using TDD funds and have built those into the baselines. The transformational items they will pursue from a regulatory strategy. Stacey said they are working on a waste determination to categorize waste correctly so that it is not all treated as high level waste (HLW). Stacey said they recognize that there may be a better cost benefit of the waste going to a different process and being reclassified.

Stacey said EM-21 has a big network of laboratories and they want to develop and grow technology capabilities through these existing avenues. Stacey said DOE-ORP wants to ensure that all of the studies they are funding will help the agency work towards an end point and focus on reducing the mission at Hanford. Stacey said negotiations are ongoing with headquarters and the laboratories to determine what studies the funds should go toward. Stacey said the technology management plan will lay out EM-21 plans for technology dollars and risks they are mitigating for ORP; the plan is expected in September.

Regulator Perspectives

- Nancy said Ecology is pleased with the money coming in. She said Ecology feels the high priority should be getting the waste out of SSTs. Ecology would like to be part of the process for prioritizing the additional money. Nancy said there is a lot of money in the short term, but in not long term, and it would make sense to focus the money on developing solutions for the long term. Nancy said groundwater is also a priority for Ecology. Nancy said she misses having the site technology coordination group. She reminded DOE that the three agencies are partners and that they would like to work together to determine where the money should go.
- Ed said it seemed like the information on page seven of the presentation was taken from the cost report, and Ecology thought the cost report had good insights. Ed said

he thought waste loading and sodium mitigation were good things to focus on.

Committee Discussion

- Gerry asked how much money is allocated for retrieval versus closure. Stacey said retrieval is funded at \$3-5 million per year from 2010-12. The lithium/bayer program is funded at \$20-22 million for the two year period. The glass studies are funded at \$6-7 million the first year and \$10 million for the second year. Gerry asked where the IPL tracks the closure dollars in the base funding. Stacey said the line item is called “establish the SST closure plan” for \$110,000.
- Gerry said Stacey’s mention of spending money on grout is controversial. Gerry said he would like to know how much money is proposed. Stacey said is it part of the closure demonstration work in 2010-2011.
- Dirk questioned the purpose of studying grout as a closure demonstration. Dirk said grout is a step not a process, and closure is a process. Stacey said they would discuss this as a part of the waste management area workshop when talking about closure. Dirk said a closure demonstration process is not going to lead to grout. Dirk said everyone thinks you can put grout in the tanks, but the issue is whether it will do anything with the waste because the grout does not interact. Stacey said she did not think they intended to study the interaction of grout with waste, they intended to look at a landfill closure scenario and if the tanks and piping systems could be filled with grout. Stacey said the issue is whether the grout they are looking at will fill the gaps and reach out into piping systems so there are no gaps. Gerry felt that spending money on this would be in conflict with the Board’s values. Stacey said ORP is moving quickly toward closure plans for waste management Area C and the more information that is available to demonstrate what the options are, the better. Dirk added that grout and concrete are well proven technologies and should not be considered part of technology development. Dirk said the money would be better spent researching something that there is little information on. Stacey clarified they would be studying whether the grout could travel uphill through pipes.
- Pam said she disagreed that the Board would not support money being spent on grout. Pam said it is possible that the tests may disprove the ability of the material to do what they want it to do. Gerry commented that a demonstration with grout is permanent. Stacey clarified that the demonstration would not be on an existing tank. Gerry said there is a demonstration planned at C-Farm in 2015 and it seems as though DOE is proceeding as if it will be a landfill closure. Gerry said that assumption will lead to a lack of characterization and retrieval. Stacey said that decision will happen through the normal processes, and that DOE’s preferred solution is a landfill closure. Gerry said RCRA clearly says that landfill closure is not an option until you have made every attempt retrieve to the extent practical.
- Larry asked if there are also funds indirectly available through EM-21 beyond the \$50 million allocated to ORP. Larry also asked if there is still a process where universities can get funding from EM-21. Stacey said there is still funding from EM-21 and there is still a process for universities to get funding through EM-21, but she was not sure

how much money is available. Billie said Florida State and Mississippi State universities will continue to be funded from EM-21.

- Pam said she was troubled to hear that Ecology has not been involved in the prioritization of the TDD funds. Stacey said that it just last week that they got an understanding between EM and ORP about what the funding should be focused on. Stacey said she plans to brief Ecology on that breakout of the funding that is within Hanford's control.
- Gerry thought ORP should involve Ecology in setting priorities for spending the \$50 million. Gerry suggested adding this to the advice.

Action Items / Commitments

Larry said he would like to hold a workshop for the committee in September to review the input they have received from the Tri-Party Agencies to prioritize work for the next year. Larry suggested looking at the committee topics and comparing them against the Tri-Party Agencies' issues that have been identified to help inform a work plan. Larry said the committee can still track issues that do not match the Tri-Party issues, but the committee should work at prioritizing items.

Dick said there are some issues that the committee should get up to speed on soon. He said he would like to know more about the new alternative in the EIS and the effect on waste storage with the change to Yucca Mountain storage. Larry said last time he talked with Lori they were not prepared to talk about that. Larry said he would check in with Lori to see if they have any updates.

Larry said the River and Plateau Committee is reviewing the statement of work for the technical expert review of the EIS. . Larry said the committee needs input from DOE about whether the funding is reasonable. Paula encouraged the committee to come up with a tight proposal because if the funding is a large amount it will be scrutinized. Jeff was concerned that the statement of work had not been vetted through the typical Board process. Larry said the committee is not developing the contract but just drafting a scope of work. Gerry said the Board had already authorized this effort through the Executive Issues Committee (EIC). Gerry said it would be desirable to have the whole Board review it, but thought it would take too long to move forward. Jeff asked that someone confirm that the effort has the Board's support. Cathy said she could bring it up at the Board meeting in September.

The committee agreed to have a half day meeting in September to flesh out their work plan for the upcoming fiscal year.

Handouts

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

- Technology Development and Deployment (TDD) Activity Update, DOE-ORP, August 6, 2009.
- Draft HAB Advice: Fiscal Year 2011 Hanford Clean-Up Budgets and Priorities, August 2009.
- Technetium Immobilization, DOE-ORP, August 6, 2009.
- Secondary Waste Roadmap, DOE-ORP, August 6, 2009.
- Tentative Dates of WMA C Future Working Sessions, August 2009.
- C-Tank Farm Performance Assessment, Vince Panesko, August 6, 2009.

Attendees

HAB Members and Alternates

Al Boldt	Pam Larsen	Keith Smith
Rob Davis	Larry Lockrem	Dave Rowland
Dirk Dunning	Jeff Luke	Gene Van Liew
Harold Heacock	Vince Panesko	
Paige Knight	Gerry Pollet	
Mike Korenko	Dick Smith	

Others

Deb Brunley, DOE-ORP	Madeleine Brown, Ecology	Cathy McCague, EnviroIssues
Paula Call, DOE-ORP	Ed Fredenburg, Ecology	Emily Neff, EnviroIssues
Mike Connelly, DOE-ORP	Nancy Uziemblo, Ecology	Stan Sobczyk, Nez Perce Tribe
Lori Gamache, DOE-ORP	Beth Rochette, Ecology	Marcel Bergeron, WRPS
Billie Mauss, DOE-ORP	Ron Skinnarland, Ecology	M.P. Connelly, WRPS
Steve Pfaff, DOE-ORP	Melinda Brown, Ecology	Kris Colosi, WRPS
	Dib Goswami, Ecology	Dan Duncan, WRPS
		Susan Eberlein, WRPS
		Tom May, WRPS