

FINAL MEETING SUMMARY

**HANFORD ADVISORY BOARD
TANK WASTE COMMITTEE MEETING
September 15, 2004
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.

Meeting Overview

This committee meeting included tours of the Waste Treatment Plant (WTP) construction site, the Cold Test Facility, and the Bulk Vitrification demonstration site. Presentations and discussions occurred either on the bus or in a meeting room at the Cold Test Facility.

Briefing on Caustic Scrubber System

John Eschenberg, Department of Energy-Office of River Protection (DOE-ORP), provided a handout describing the caustic scrubber system in the WTP. As off-gas leaves the Low-Activity Waste (LAW) melter, it enters a submerged bed scrubber (SBS), which removes particulates. From there, the off-gas is directed through the wet electro-static precipitator (WESP), which removes aerosols. The High-Efficiency Particulate Air (HEPA) filters remove small particulates, followed by mercury removal in carbon beds and further oxidation with catalytic reduction beds.

The caustic scrubber is last in line. The off-gas enters very hot (250 – 300 degrees fahrenheit) so the temperature is drawn down to 100 – 200 degrees fahrenheit. The material moves through ceramic media and exits either via the flue or the caustic collection container.

Note: This draft summary represents EnviroIssues’ understanding of the subject matter covered in this meeting. If this differs from your understanding, please notify us.

Regulator Perspectives

- Suzanne Dahl, Ecology, noted that the flow sheets indicated a change in iodine, with more iodine going to low-level treatment. John responded that out of the 55 million gallons of waste, only 43.9 curries are iodine. Though that is a small percentage, iodine is very mobile and soluble. The scrubbers are sized to handle this by having a decontamination factor of 100 (from 100 particles, 8 are passed out the flue). Eighty percent of the iodine will go through supplemental treatment. John noted that the effluents will meet all federal and state standards.

Committee Discussion

- Pam Larsen inquired whether the scrubber was adequately sized. John responded that he believes the scrubber was appropriately sized. The scrubber will not capture 100% of the iodine, but there will be stack monitoring. Also, the caustic scrubber does pass some material through to bulk vitrification.
- Paige Knight asked about the lifespan of the parts in the scrubber. John responded that there are no parts in the black cells that need replacement; the scrubber parts are out in the open and accessible for replacement.
- Todd Martin inquired what percentage of the iodine will be in glass and what happens to the remainder. John responded that it will be captured at the Environmental Restoration Disposal Facility (ERDF) and the Effluent Treatment Facility (ETF). Suzanne noted that technology will need to be developed in order for iodine to be placed in a form acceptable at ETF or ERDF.

Briefing on Archimedes Technology

John Eschenberg explained that Archimedes is a privately funded high-tech company located in San Diego, California. The Archimedes Filter has been developed with the purpose of reducing waste at Hanford. It uses a process to separate plasma ions based on their atomic mass. In theory, the Filter rotates and utilizes magnets on the exterior to focus the ions. The heavier ions (atomic mass greater than 90) are drawn out and can be ejected. This could potentially reduce the number of canisters of high-level waste that have to be produced at the WTP.

John visited the facility to view the technology. He was impressed with the scientific and business capabilities of the company; however, he noted that the Archimedes Filter had only been run for a few seconds, which does not prove the technology can run long-term. This fall, waste oxide will be tested in the Filter. John said he is “cautiously optimistic” about this new technology.

Tank Retrieval Progress Update

Jim Thompson, DOE-ORP, provided an update on the progress of tank retrieval. One tank has already been retrieved and three more (S-102, S-112 and C-203) are in progress. For S-102, retrieval (using modified sluicing) will begin in October 2004 and is scheduled to be complete by March 2005. The schedule is very tight because there have been many issues. One problem encountered has been the tendency for sodium phosphate in the tank to solidify. Temperature controls are being evaluated as a solution to prevent possible plugging of pipes.

70% of the volume has been retrieved from C-203, but it is currently shut down in order to address some of the problems. The goal is to resume retrieval in October.

Near-term activities include a focus on retrieval at C farm with the priority being the oldest tanks and the ones closest to the river. A mobile retrieval system (MRS) consisting of a vacuum system coupled with a crawler will be used. With other tanks (B, T and U, which DOE believes contain transuranic waste), a modified sluicing system coupled with a vacuum system will be used.

Regulator Perspectives

- Jeff Lyon, Ecology, noted that a representative from Ecology has been at meetings every week in order to stay ahead of the process. Because some details have been missed, Ecology is making every effort to improve the process for communication.

Another issue for the retrieval of S-102 is the proposal for using supernate instead of water. It will be a new process that Ecology and DOE evaluate together in order to understand the differences; Ecology has some concerns regarding risk issues. In addition, there is some question as to what would be left in the tanks if supernate were to be used. Jeff said Ecology would likely ask for a freshwater rinse.

- Suzanne asked for every gallon of raw water that is used, what is the result in extra glass and vitrification time? Jim responded that the rule of thumb is that each double-shelled tank will result in one additional glass canister. Suzanne commented that's a great argument for using supernate.

Committee Discussion

- Keith Smith asked what solution is added and Jim responded that if hot water is added to the tank and it is allowed to sit, the salt will dissolve which will raise the specific gravity. There is a central pump and the saline is pumped out to a double-shelled tank.

- Shelly Cimon inquired why the hose was not set initially in a straight line and Jim responded that there had been miscommunication when information that was learned at the Cold Test Facility was not transferred to the tank farm. With a supported hose, 50-60% solids are retrieved rather than 10-15%.
- Monte Wilson asked if the waste was stratified. Jim responded that when the waste is “fluffed up” and enters the vacuum system immediately, the system works well.
Jim commented that though some of the material is salt cake, not all of it is, which leads to difficulties with mobilization. To mobilize the sludge, a large volume of liquid is needed.
- Dick Smith had heard that it would take a major engineering system to re-design the vacuum and use it on multiple tanks. Jim responded that engineering is not the problem; the problem is that existing equipment would have to be pulled out of the tank, which poses an exposure risk for workers. In addition, the interface would have to fit accurately so that the vacuum system can rotate. The plan has been to abandon the pieces that are below grade.
- Todd noted that, given the current barriers to shipping transuranic waste (TRU) from the tanks, the system might start up and then essentially be in stand-by because there is no disposition path. From a budget priority standpoint, pursuing this does not seem to make sense. Jim countered that, even though there is not a clear disposal pathway, DOE would still be moving material from non-compliant storage into a compliant storage facility. Suzanne clarified that Ecology has issues permitting a TRU facility because there is no disposal path (possibly leading to the creation of an orphan waste stream) and because the waste has not been treated to meet land disposal restrictions (LDR).
- Todd asked how far DOE has slipped off schedule. Jim said there was about a four-month slip.

Tank C-106 Appendix H Process

Roger Quintero, DOE-ORP, provided an update on the Appendix H process. Since 1998, there has been both volume and curie reduction in the tank. The volume was reduced from 30,800 cubic feet in 1998 to 370 in 2003. The total curies were reduced from 10.1 million to 134,000. The technetium-99 curie reduction accounts for 99% of the radiation risk. There have been no indications of leaks during retrieval.

The technology/cost evaluation for additional waste retrieval included two modified sluicing alternatives, a mobile retrieval system, and modified sluicing followed by use of the vacuum retrieval system. The analysis was based on an assumption that an additional 150 cubic feet of waste from C-106 could be retrieved and indicates that the cost of further retrieval would be very high.

The basis for the exception request for C-106 is as follows:

- The risk reduction for 150 cubic feet is very small.
- The cost for additional retrieval technology would range from \$5.7 to \$13.5 million.
- The measured volume of residual waste is 370 cubic feet.
- DOE believes the limits of technology have been reached.

Though Ecology agreed that the limits of technology for modified sluicing and acid dissolution in C-106 had been reached, they did have several issues:

- Ecology would like for DOE to complete Step 2b of the Appendix H process, which requires DOE to engage with the Nuclear Regulatory Commission (NRC). Currently, DOE is in the process of completing an agreement with NRC to do a technical review and offer comments on ways to improve the process or products. A meeting has been scheduled with NRC and Ecology in late September.
- Ecology asked for a demonstration of Mobile Retrieval System (MRS) and Vacuum Retrieval Technology because they did not feel these technologies were mature enough. DOE disagrees since there has been a lot of data produced through extensive testing.
- Ecology had concerns regarding other technical issues such as waste assessment, volume assessment, risk assessment, leak loss data and close out and lessons learned. DOE is meeting with Ecology to satisfy these concerns.

Roger also added that DOE is exploring other methods of calculating volume. Using a video is the one method that is accepted by Ecology currently. Developing alternate methods would require Ecology's approval.

Regulator Perspectives

- Regarding the vacuum system, Jeff said Ecology thought that field deployment would be critical to understand the data. Ecology does agree that the limits of technology development have been met. If NRC will voice an opinion, that will satisfy Ecology's needs.
- Jeff also noted that Ecology did not like the video method and is open to trying other volume measuring devices. The test at the Cold Test Facility for the video method had good results when there are features in the tank, but does not work as well with no references. There could be up to 50% error in volume estimates.

Committee Discussion

- Paige asked about Ecology's stand on formal versus non-formal agreement from NRC. Suzanne responded there have been a series of agreements that NRC called "consultations" or informal agreements. (NRC seems to be rather sensitive about what the agreement is called.) Ecology would like something similar.
- Pam asked how the progress in Appendix H relates to the Tank Closure Environmental Impact Statement (EIS). It seems that Ecology is challenged about what they can agree to because the new EIS is not completed. Roger responded that retrieval is covered by the Tank Waste Remediation System (TWRS) EIS from 1998. When the EIS is received, Ecology will analyze how the residuals fit in with closure goals. The actual decision of how the tanks will close will be in the EIS. The process for Appendix H can move forward and it will feed into the EIS, which is why some of these issues are critical.
- Al inquired whether three hoses could be used instead of just one to cover more area in the tanks. Roger responded that the waste is distributed across the tank and all useable space is taken up by pieces of equipment. A major cost of MRS is the installation of equipment.
- Paige asked how the lessons learned would be incorporated and stated her concern for adding water to the tanks. Roger responded that a list of lessons is being compiled. DOE will not use certain technologies in leaking tanks.
- Leon asked whether the Tri-Party Agreement (TPA) requires a confidence level or uncertainty range to be associated with the 370 cubic feet. John Swailes, DOE-ORP, replied there is no required confidence level. The TPA volume is a benchmark standard to reach. Suzanne clarified that the TPA number came from adding up the volumes of all the tanks of a particular size, taking one percent of that total, and then dividing that number by the number of tanks. When Ecology initially agreed to consider a waiver for the 370 cubic feet in C-106, the assumption was that good science would be applied to defend residuals above the TPA limit.
- Leon asked about the estimate of curies leftover in the tank. Roger responded that the number was measured based on volume and characterization. It is a product from the inventory times the concentration.

System-Wide Mass Balance

John Swailes reviewed the presentation he had made to the committee in May 2004. He focused on the iodine (I-129) page because of the questions raised as to where iodine goes in secondary waste products. It has been estimated (based on conservative calculations) that some iodine will go to secondary waste. Some will go to ETF, where the performance is known, though it will not be used for all situations.

The alternative LAW treatment would be bulk vitrification. Currently, the flow sheet indicates that 60% of the LAW would go directly to bulk vitrification with little or no pre-treatment. None of these systems would remove iodine. Effluents would be brought back and recycled. The off-gas liquids would contain iodine, which would be removed and sent back to pre-treatment or to alternative LAW (bulk vitrification). Material for ETF would be processed through alternative LAW or ETF directly. Because bulk vitrification uses similar offgas, most iodine would be in the liquids that would go to ETF.

Initially, it seemed that very little iodine would be retained in the glass, but now there are other estimates. There may be ways to optimize the fraction that is left in the glass.

The question becomes what needs to happen at ETF to deal with iodine. The focus has been on treatment and processes needed at ETF as well as what treatment is needed for disposable waste – ion exchange or chemical removal processes. DOE is analyzing what options exist at ETF to produce the desired outcomes. Because the total curies are low, the total volume should be modest.

Processes to recycle in bulk vitrification and at the WTP are being reviewed. The most cost-effective method will have to be analyzed to determine what is the best combination of options. The minimum standard of a factor of ten for groundwater impact is the baseline.

Regulator Perspectives

- Suzanne was pleased to hear the conversation is acknowledging that there may be a bigger problem with iodine if 80% of the iodine is sent to ETF and it is not being treated to meet LDR. Suzanne also encouraged DOE to note what is happening with mercury.

Committee Discussion

- Paige questioned how iodine percentages change when mixed with a new batch of waste. John responded that the bulk vitrifier will remove 20% of the iodine with each sweep. Initially, the concentration will build up but then it will start diminishing.
- Todd noted that there appeared to be some rounding errors with the mercury mass balance and asked if this was a snapshot of down the road. Suzanne responded that it is recycled.
- Al commented he was pleased to hear DOE recognize that they had an issue, but was concerned that the sodium mass balance seemed to be glossed over. ETF will not handle the sodium and the integrated disposal facility could handle five curies which is only 10% of the volume. John responded they are planning on designing a waste form that will meet groundwater standards. DOE is getting ready to do some more

system runs and then ETF will be brought into the picture to be analyzed. It was known years ago that the specifications for ETF would not be satisfactory, but other aspects of the system were focused on first. Now that the ETF component is being added, it will be important to review how the mass balance is affected. Sodium will have an impact but not in volumes that would be considered significant.

Tank Vapor Safety Update

Joel Eacker, CH2MHill Hanford Group (CHG), provided an update on tank vapor safety issues. With nitrous oxide, extensive monitoring was performed with personal monitoring and sampling. It was noted that a match up with ammonia does not always occur. Breathing circles were posted and there was no detection within the five-foot boundary.

In 2003, sampling was performed with patches or vacuum tubes. As of last year, 1000 samples were completed which showed zero instances above standards, but some at detection levels. The goal is to develop a long-term strategy for using this data. Photo ionization devices are being tuned to pick up some things that had not been picked up before. It is anticipated that data collection for the first round will be completed soon.

Engineered controls are a challenge in the field. Stacks have been extended and the exhauster has been changed. Cameras have been installed to be used instead of placing people in certain situations. Monitoring reviews have also been changed.

Sixteen head spaces have been sampled with the goal of sampling thirty-four by the end of the year. This will be compared to what was completed in the past in order to set up a plan. The data, so far, does not show much change.

Regarding the industrial hygiene program, ten new staff have been added and are participating in a training course. Current staff also are participating in this course, which has been a hard process for many of the industrial hygiene professionals. Many have chosen to leave, so sixteen sub-contractors have filled their spots.

Regulator Perspectives

- Suzanne inquired whether the databases communicate both ways; that is, is the monitoring data being shared with technical staff? Joel responded the intent is not only to have the data communicate both ways, but to have people do the same.

Committee Discussion

- Jim Trombold noted that some real value of this work may also come from the characterization of tank vapors. He asked if a broad spectrum could be tested. Joel

responded there are 1725 items on the list and some others have been suggested. In October, a document will be released followed by the roll-out of a new strategy.

- Pam commented that Hanford Atomic Metal Trades Council (HAMTC) was very complimentary of CHG's progress.

Committee Business

Leon Swenson announced the committee chair, Doug Huston, has resigned. Paige Knight suggested that it may be possible to lead with co-chairs. Paige would consider serving as a co-chair with Leon. Pam Larsen noted that the co-chairs could alternate the task of chairing the committee meetings and could equally divide management of the issue managers.

Handouts

- *Action Path – Vapor Exposure Protection Improvements*, CHG, August 26, 2004.
- *Caustic Scrubber*, John R. Eschenberg, September 15, 2004.
- *System Wide Mass Balance*, John Swailes, May 13, 2004.
- *Tank 241-C-106 Appendix H Process*, Roger Quintero, September 15, 2004.
- *Waste Retrieval Project Status*, James F. Thompson, Jr., September 15, 2004.

Attendees

HAB Members and Alternates

Al Boldt	Todd Martin	John Stanfill
Shelley Cimon	Maynard Plahuta	Leon Swenson
Harold Heacock	Jeanie Sedgely	Jim Trombold
Paige Knight	Dick Smith	
Pam Larsen	Keith Smith	

Others

John Morris, DOE-RL	Nolan Curtis, Ecology	Ryan Dodd, CHG
John Eschenberg, DOE-ORP	Suzanne Dahl, Ecology	Joel Eacker, CHG
Erik Olds, DOE-ORP	Jeff Lyon, Ecology	Moses Jarayssi, CHG
Roger Quintero, DOE-ORP		Bryan Kidder, CHG
John Swailes, DOE-ORP		Rick Raymond, CHG
Jim Thompson, DOE-ORP		Tammie Holm, EnviroIssues
		Lynn Lefkoff, EnviroIssues
		Marlies Wierenga, EnviroIssues
		Monte Wilson, Nez Perce Tribe
		Kim Ballinger, Nuvotec/ORP
		Sharon Braswell, Nuvotec/ORP

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