

## **FINAL MEETING SUMMARY**

### **HANFORD ADVISORY BOARD RIVER AND PLATEAU COMMITTEE MEETING January 8, 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**

Maynard Plahuta, River and Plateau Committee (RAP) Chair welcomed the committee, introductions were made, and the committee adopted the November meeting summary.

#### **Institutional Controls – Summary of Board Advice**

Bob Suyama said during the past 10 years, the Hanford Advisory Board (HAB or Board) has issued several pieces of advice on institutional controls (ICs) and long-term stewardship (LTS). The U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) are currently in the middle of creating a record of decision (ROD) for a number of sites. Bob said because of this it is timely to remind these organizations what the Board's values are on ICs.

Bob handed out a draft summary of past advice and draft transmittal letter that he proposes the committee submit to the Board to adopt and present to the Tri-Party Agencies (TPA). He said he felt the best way to issue this reminder is not as advice, but as a white paper that summarizes the HAB's values and past advice. Bob said this is the first step in re-laying the groundwork of what the Board is working toward, and from there a number of other activities can follow along.

Bob said since the last time RAP saw this document he added suggestions from Dennis Faulk, EPA, on ICs that should be established when land is transferred out of DOE control to prevent groundwater intrusion. Bob said he also received comments via e-mail, and will add these to the document.

### *Regulator Perspectives*

- Dennis said one of the Board's first pieces of advice on ICs (Advice #63) had a white paper attached that included the fact that the government retained mineral mining rights. Maynard asked if this included gravel and Dennis confirmed it did.

### *Committee Discussion*

- Vince Panesko asked when the RAP was going to address the topic of including the cost of ICs as part of RODs. Bob said this is one of the next steps the committee needs to take. He said the current goal is to summarize all of the Board's past advice, then move onto this issue as well as a LTS plan.
- Maynard asked whether including the costs of ICs should be part of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) process. Dennis said it should be part of this process, as it is difficult to assign such costs to an individual clean up. He said helping determine how to take the ICs through the nine-criteria evaluation and assign partial costs for each individual section is one area where future advice from the Board would be helpful.
- Vince said that DOE prepared a LTS Program Plan for Hanford in 2003 with 16 commitments expected in the next five years. Vince said that DOE is updating the LTS Program Plan in 2009. He suggested the RAP consider advice to DOE that the 2009 update should document progress and provide new 5-year implementation plans for each of the 16 commitments made in Chapter 3 of the 2003 plan.
- Maynard asked whether there will be a draft copy of that plan out for review. If it is possible to review it in a draft stage, he said the Board could potentially provide advice at that time. Bob said the last time Boyd Hathaway, Department of Energy – Richland Operations Office (DOE-RL) attended a committee meeting to report on ICs and LTS, he said he would come back and update the RAP on the progress of the report. Paula Call, DOE-RL, said she will let Boyd know the committee would like an update.
- Keith Smith said the idea of ensuring irrevocable actions are not taken during the current cleanup effort needs to be captured in this summary of past Board advice. He suggested adding this to the third bullet from the bottom of page three, which summarizes HAB Advice #141. Bob said he will add more detail to this point.
- Shelley Cimon asked whether there is a way to capture the costs of damage to natural resources in the National Research Council (NRC) assessment at the beginning of the process, rather than after the assessment has been completed. Barbara Harpo, Confederated Tribes of the Umatilla Indian Reservation (CTUIR), said the trustee

council is beginning to address how to coordinate and integrate the costs associated with the injury assessment and losing the use of resources as a result of injury to ICs. Shelley said creating a line item for natural resource damage assessment has been mentioned. Barbara said the council is currently working on submitting a letter on this to the Obama transition team. She said the funding needed is partly within the target and partly over target.

- Dirk Dunning asked if this was exclusively a summary of past advice, or if new thoughts would be included. He said commitments should be included in the natural resource issues section of RODs. Dirk said he would like to include as part of new advice to have default actions in place in the event ICs fail. Maynard said the committee is currently working on distributing the white paper to the agencies, and will then be following up with new advice.
- Maynard asked the committee if they agreed that the white paper and transmittal letter should be brought before the Board in February; they agreed.

### **Science and Technology Roadmap**

Shelley said in 2007 the House Water and Appropriations Report had DOE create a science and technology (SNT) roadmap to utilize and reinvigorate the core capabilities of national labs and support their work. This roadmap includes the Oak Ridge National Laboratory (ORNL), Savannah River National Laboratory (SRNL), Idaho National Laboratory (INL) and Hanford sites. Shelley said the intent was to maintain the infrastructure of the labs and to support bench-scale work and pilot study demonstrations that support end cleanup, with an emphasis on radio chemistry.

Shelley said five Board members weighed in on the draft report twice in 2007. She said the goal was to have discussions that will allow the Board to comment on the S&T roadmap as it continues being developed. The NRC, which is part of the National Academies of Science (NAS), is evaluating the S&T roadmap. Shelley said an interim report was released, and a follow-up report should be released in early 2009. Funding has fluctuated for S&T s, and the United States Department of Energy Office of Environmental Management (EM) intends to get back on track with integrating the needs of the site with the potentials of labs. Shelley said the committee wanted to hear current actions being taken at the Pacific Northwest National Laboratory (PNNL) to support this national effort. She said since funding has gone directly to the labs and is not earmarked, one of the committee's goals is to understand how the S&T money is allocated.

Terri Stewart, PNNL, provided an update on the roadmap's progress, including information on how PNNL identified technical risks, how it operates on a day-to-day basis, and information on projects that are of interest to Hanford.

Terri said the primary objective of the Environmental Management (EM) program is to reduce technical risk and uncertainty in the DOE-EM cleanup mission. She said in some cases this includes dealing with known risks, and in others it deals with unforeseen risks that require reacting and responding. EM-20 is the technical handle for the broader EM

program, and aims to provide technical solutions where they do not exist and improve on existing solutions through safety or operational issues. Terri said EM-20's work may provide an alternative to a baseline that significantly improves baseline risks.

The National Laboratory Advisory Group (NLAG) is led by SRNL, but other sites participate to ensure laboratories are working as team. Initiative Development Teams (IDTs) do day-to-day work to define programs and implement them, focusing on three areas: groundwater and soil remediation, waste processing, and decontamination and decommissioning (D&D).

The program's approach works to identify technical risks and uncertainties early in a project's lifecycle. External technical reviews and technology readiness assessments generally occur through DOE, and look at past NAS reports on remediation to come up with technical needs. For Hanford, vadose zone contamination was a primary concern identified by the external review process. Risks are also identified by asking each DOE site to identify its technical needs and sorting these needs into six categories: technical assistance; basic science using applied research and engineering; common needs identified by contaminant and problem; schedule for technical insertion; potential for cost or risk reduction; and opportunities for leverage. Terri said there are four areas of need categories within the roadmap's strategic initiatives: sampling and characterization technology; modeling; in situ technology; and long-term monitoring.

Terri said there is a total of \$100 million in funding for the entire EM-20 program, with \$5 million going to enhanced remediation for soils and groundwater, including in situ treatment of technecium in the deep vadose zone, attenuation-based remedies, chlorinated solvent remediation, and mercury characterization and remediation. Approximately \$300,000 was allocated to integrating advanced predictive capabilities with enhanced remediation projects, including a technical forum from the DOE Office of Science. \$250,000 of the funding is going toward improved sampling and characterization strategies, and \$500,000 went toward The Center for Sustainable Groundwater and Soil Solutions at SRNL. Terri said the program's focus for fiscal year (FY) 2010 will be on lifecycle monitoring, which will include a technical forum in February.

Terri provided an example of a project on in situ treatment of metals and radionuclides in the deep vadose zone to illustrate the scope of projects and how they are organized. This project had to choose one material to study, and after considering the field of activities, what was common across all sites and what would have the highest impact, the team chose technecium. Once the researchers understood how to control the flux of materials in the deep vadose zone, they looked at ways to reduce or remove materials by using in situ treatment or enhanced attenuation, which allows the natural system to handle more contaminants. A technical working group (TWG) is at the core of each project, and identifies lines of inquiry, technical targets, instigates tasks and projects, identifies solutions, and creates technical documents. Examples of technical targets for this project's goal include controlling processes, characterizing heterogeneities in the subsurface, modeling, subsurface delivery, and monitoring. Terri said some of these

technical targets are funded by EM operations at the site, while some require coordinating efforts with other researchers.

Another project that is underway is the study on reducing the transport of chlorinated organics through the vadose zone, an effort SRNL is leading. Terri said this project takes a scenario-based approach, looking at what technical guidance documents regulators would need to make decisions, and then providing scientific information on these. SRNL is also leading studies of monitored natural attenuation and enhanced attenuation for chlorinated solvents.

Terri discussed The Center for Sustainable Groundwater and Soil Solutions at SRNL, which is the focal point for technology transfer and research integration for the Office of Engineering and Technology Soils and Groundwater Remediation Program. This organization has the goal of quickly disseminating information, and includes a website with a portal search, links to other useful sites and an Ask the Expert section where visitors can post questions that are answered by a prequalified expert. The Center will also conduct four technical forums this year, and is a resource for expert reviews. Columbia River Protection Projects underway are studying chromium in the 100-D and 100-K Areas, strontium-90 in the 100-N Area, uranium in the 300 Area and carbon tetrachloride parameter studies in the 200 Area.

Terri concluded by stating EM20 is focused on DOE's unique problems by using national labs to tap into expertise and retain it. Leveraging is an important piece of these studies, especially due to budget constraints, and EM20 is striving to improve the ways findings are communicated. Terri said it is early in the program, and only the first sets of technical activities are underway. She said roadmap projects help sites in multiple ways by making systematic program differences and bringing experts forward for technical reviews.

John Zachara, PNNL, discussed two projects conducted by the Office of Science/Environmental Remediation Sciences Division (ERSD) at Hanford: the PNNL Scientific Focus Area (SFA) and the Integrated Field Research Challenge (IFRC). Jon said the ERSD is the funding agency for these projects, and focuses primarily on contaminant fate and transport and environmental microbiology. ERSD is the steward of PNNL's Environmental Molecular Sciences Lab (EMSL), which has a \$25 million budget. John said ERSD aims to have a positive impact on clean-up progress, and its primary product is peer-reviewed publications and scientific insights to solve clean-up challenges.

The SFA is a small-scale, lab-based project directed at understanding microscopic, geochemical, physical and biological processes. The SFA consists of 12 independent projects that were re-programmed as a collaborative project to address a focused suite of issues, and each lab was assigned to an area where it had internationally recognized expertise. The project consists of Hanford-inspired research topics, contaminants, and science themes such as microenvironments and transition zones. John said SFA is closely aligned with the Hanford 300 Area IFRC, and makes use of EMSL and other unique

DOE capabilities. He said the concept allows for maximum collaboration and synergistic impact, and the research will be applied to other DOE contaminated sites and environmental problems. Initial SFA research is focused on polyvalence, which impacts how quickly contaminants move through the environment, past releases to soil, long-term concerns and scientific issues, and important science opportunities that can be resolved. The scientific theme for this research is the behavior of contaminants in microenvironments and the contaminant zone, focusing on advanced models, remediation possibilities and future predictions. The SFA is also looking at transition zones, including how changes to the valence state of a material affect its mobility. John said understanding microscopic speciation can be applied to what happens on a larger scale in the field.

The IFRC is a field-based, macro approach to the same issues studied in the SFA, and focuses on plumes. The Hanford field research challenge (FRC) is one of three sites funded to study a uranium plume – the other two sites are in Rifle, Colorado and at ORNL. John said the seasonal changes of the 300 Area uranium plume are representative of the problems faced at Hanford, as many of the model calculations performed have been shown to improperly describe the plume's behavior. The science theme of the Hanford IFRC focuses on the multiscale mass transfer processes that influence sorbed contaminant migration. Issues associated with this theme are the accurate projection of dissipation times for groundwater plumes, optimal delivery of remediation reactants and the effectiveness of remediation.

Over the summer a sophisticated well field was installed in the area. John said this well field represents a significant investment by the Office of Science, as installation and equipment alone cost approximately \$2.5 million. The well makes it possible to follow the plume's migration, and will allow for the understanding of heterogenic behavior and substructure in the 300 Area. Schematic experiments conducted by injecting warm water into the system and monitoring its movement will allow for the development of robust models. John said this is a five-year project with a planned number of field experiments to understand uranium concentration dynamics within the plume, uranium fluxes from the vadose zone, and optimized and sustained remediation strategies. In November a tracer test for hydrologic characterization was conducted, finding a dramatic coupling of migration from groundwater to the river, as well as indications that zones exist that have bromide slowly filtering in and out of them.

John explained the linkage between the SFA and IFRC research. He said this research is intended to have impacts on remediation and closure decisions, and in some ways could be a model for infusing DOE scientific findings into decisions at Hanford. He said the studies are strongly focused on understanding behavior by looking at processes, and will hopefully provide context for improved remediation strategies by creating models that describe the systems. John said the ERSD seeks to have a positive impact by disseminating information to environmental managers, and aims to communicate by posting significant findings to its websites.

### **Regulator Perspectives**

- John Morse, DOE-RL, said DOE closely tracks a number of these science initiatives, and coordinates them with onsite programs. He said DOE has picked up all of the programs initiated by Congressional funding and will continue to do this, as these have been extremely helpful, with effective working relationships between the funding, research teams and programs.
- Craig Cameron, EPA, said it would be nice to have additional funding for this program. He said it is important that funding and effort goes into very specific on-the-ground projects. Craig is involved with deep vadose zone tests, and said it is an important need to come up with a solution for many of the waste sites.
- Nancy Uziemblo, Ecology, said she wishes there were a forum to learn about these technologies, which would help identify current needs and their potential solutions. She said Ecology follows some of these issues closely, but they are spread out, and she is not sure there is a forum to coordinate the efforts of contractors, PNNL, and EM 21.
- Ginger Wireman, Ecology, said it would be useful to have an outline of the well contours at the 300 Area uranium plume site, since it provides real-time logging of the flow rate. She said people assume Hanford has high water in the winter months, but the highest water is usually in the spring and summer. She asked whether, at some point in the cleanup, it will be necessary to work with the United States Army Corps of Engineers (Corps) to conduct research at Priest Rapids. John said the tracer experiment was done when water is at yearly low, and new information from the Corps is needed on what the projected water levels are. He said the tracer experiment was designed with a flow vector in mind that was not there during the course of the experiment. He said there is now an hourly monitoring system in the river in intermediate surveillance wells and around the periphery of the site that allows for real-time coordination. He said a model of this is needed, but the system was set up so it could be monitored in real time.

### *Committee Discussion*

- Gary Petersen asked whether funding came directly from EM-20, and not through DOE-RL or DOE-ORP. Terri said a total of \$5 million total comes to the complex. This year \$1.5 million of this went to the lab.
- Pam said the RAP would be interested in learning the status of the contaminants being studied as part of the Columbia River Protection Projects funded by EM-22. John Zachara is the project manager for this, and an update on this could be included at a future committee meeting.
- Shelley asked how the Board can access the progress of these projects, and whether any of the four forums taking place during the year will be near Hanford. Terri said none of the forums are nearby, but PNNL is planning and coordinating the forums. Terri said PNNL could brief the committee on the forums and provide them the opportunity to respond to the forum's results. Also, if the committee has an interest in a specific topic, PNNL could provide more information on it. She suggested PNNL come back following the lifecycle monitoring forum in February, as this is not

necessarily a subject that has been broached at Hanford. This would be timely because PNNL has not started work, and the Board could get a sense of what experts are saying on the issue.

- Maynard asked what the collaboration is between the Office of Science Headquarters and EM-21. Terri said Skip Chamberlain, the immediate program manager, conducts weekly meetings and participated in a review of all of the science focus areas. Additionally, she said an external panel conducted a program review of the entire program in late September, and federal project managers and the Office of Science were both represented.
- Dick Smith asked whether there is funding to research treatment immobilization, and if any studies on this are underway. Terri said there is initial funding for this, and some work, including leaching studies on sludge, is in progress. She said funding for waste processing studies is generally distributed project-by-project
- Dirk expressed concern that this process is not as open as the technology coordination group, which was a two-way discussion and involved many perspectives early in the process. He said he is worried this process will result in decisions about technology that have not had a large enough variety of input. He said if this process is not more open, it may lead to dead ends, such as bulk vitrification, where there were other options that needed to be considered. Dirk said monitored natural attenuation (MNA) is an outcome that is a long way down the road at Hanford, and asked how the process of studying this could be more open. Terri said the program recognizes SRNL is at a different stage of cleanup than Hanford, and studies on this may be useful when Hanford gets to that point. She said in the future PNNL could come back and gather feedback from Board members.
- Shelley said expert panels have been wonderful in the past, providing Board members with an opportunity to state their views and potentially change the dynamic of the panel's discussions. She said it is discouraging when there is a disconnect between expert panels and the Hanford site.
- Pam asked whether SRNL is looking at Hanford's experience of MNA not working for uranium in the 300 Area for its own studies. Terri said yes, SNRL is aware of Hanford's experience with MNA.
- Pam said she has observed that funding may be available to explore a particular contaminant or challenge, but the funding to implement solutions can be difficult to obtain. She asked how PNNL's funding takes the studies from lab to field. Terri said this is why PNNL must leverage field activities, as there is not enough money to get into the field. She said this is why TWGs often have a site representative who coordinates field activities and tracks schedules and priorities. Pam asked whether the money needs to come from a contractor. Terri said the EM-20 portion of this coordination comes from the scope.
- Shelley asked whether there is anything to help determine the source of contaminants in the 300 Area plume. John said researchers are currently analyzing 200 samples from the well field, and are developing a three-dimensional geostatistical model of uranium concentrations from the vadose zone and a model of physical and

hydrological properties. He said 100 analyses of uranium concentrations have been conducted, and consistently showed elevated concentrations of uranium in the vadose zone in the range of 5 to 25 parts per million, with a peak occurring in what is called the smear zone, a zone that periodically experiences fluctuations in water table. He said this indicates uranium originated above the vadose zone and went into the aquifer. The uranium present in the smear zone potentially indicates redistribution during historical high water events. John said the model will provide a three-dimensional picture of this system to evaluate the spatial variability of uranium concentrations, which can then be linked to the concentration of uranium in groundwater during different seasons to test whether uranium is a source during those times. He said there is a category on the IRFC website called “programmatically documents” that includes the characterization plan from the well field.

- Dirk said these studies are focused on the end result of MNA, rather than understanding the system. He does not think taking actions that allow uranium to slowly fade away should be the basis of a research project. He said if uranium is coming out of the upper vadose zone through carbon-laden water it will ultimately end up going to the river, causing carbonate to decrease and turning it into uranium tetra oxide. John said the research he described is supported by the Office of Science’s missions and goals, and aims to understand the phenomenon involved in cleanup. He said when looking at making a decision about the plume that could cost potentially billions of dollars it is important to understand all aspects of the plume. John said different groups at DOE have different objectives and mandates, and the Office of Science cannot address whether MNA can be applied at the Hanford site.
- Shelley said \$1 million was given to Washington State University (WSU) for actinide research on plutonium, and asked whether that money came through the labs. Terri said it did not come through the labs. John said he could find out where this funding came from.

### **Enabling Assumptions and Integrated Priority List**

Paula Call, DOE-RL, handed out the DOE-RL projects baseline summary, which is available on the EM website at <http://www.em.doe.gov/Pages/ProjectList.aspx>. She said all DOE offices have done this summary for each cleanup site, as directed by EM, and it includes a project overview, objectives and summary schedules from 2008 baselines. The project assumptions handout was requested in the Board’s last advice letter, and includes a bulleted list for each project that was taken from current project execution plans for each project, which are EM approved in scope. She said the summary and baseline schedule are updated as needed for each cleanup project, and this was last updated in November 2007.

Maynard said at the Committee of the Whole (COTW) meeting it was decided that the Tank Waste Committee (TWC) and RAP would review the assumptions and integrated priority lists (IPLs) and come up with their own priority list for the Budgets and Contracts Committee (BCC) to bring forward as advice. Maynard said the BCC is looking for key projects that the committees think should be funded. He suggested brainstorming a list of

key aspects of the RAP program or activities that should have adequate and sufficient funding. Maynard said on the DOE-RL priority list the funding line is at \$1,084,938,000. He recommended keeping in mind that if funding is available from the economic stimulus package, projects that create jobs right away should be funded.

Matt McCormick, DOE-RL, briefly reviewed the baseline summary, IPL and project assumptions. He said DOE received a milestone change package on December 10, 2008 concerning the establishment of 42 new milestones on cleanup of groundwater in the vadose zone of the river corridor. He said DOE had discussions with Ecology and EPA on this change package during the previous week. He said DOE will brief the HAB on the preliminary results of those discussions on TPA milestones. He said the areas they are discussing are not new in terms of technical problems or potential budget impacts, but they concern how the parties are addressing those areas of cleanup either along the river or on the Central Plateau.

Matt said the project assumptions are used to build a baseline that must pass an independent certification process. The emphasis for this certification is how projects are managed across DOE, and he said the department needs a better process, schedule and way to implement changes. The assumptions are used for baseline certification, and still have to go through a CERCLA process. Matt said the independent certification process is used to determine that costs are consistent with industry standards.

### **Regulator Perspectives**

- Barbara said the NRDA (Natural Resource Damage Assessment) is in the priority list as partly over the funding target and partly under target. She asked how this is split and what the consequences are for funding only half of this item. Maynard suggested prioritizing the complete funding of NRDA, and not separating this project. This is part of project baseline summary (PBS) 100.
- Ginger suggested using the buzz words “shovel ready” or “drill ready” to describe a projects’ readiness in the advice, as this would be an important consideration for economic stimulus package funding.
- Barbara said zero-period acceleration (ZPA) is the subject of a final ROD. She asked how EPA feels about putting ZPA issues in the final ROD priorities. John Morse, DOE-RL said ROD compliance depends on what the schedule is and what the remedial design and remedial action work plan are. He said this has not yet been approved, and until that is in place it is not a conflict.
- Barbara suggested funding projects with a bias towards action; getting work done on the ground should be a priority.

### **Committee Discussion**

- Pam proposed the priority of supporting resumption of full transuranic (TRU) waste retrieval and treatment to meet TPA M91-42. PBS: 0013.

- Shelley said in tandem with this, remote handle (RH) capability to deal with 618-10 and 618-11 TRU waste is needed. She said without this capability the project will not be able to get off the river. PBS: 0013.
- Shelley said there is a 77,000-ton limit at Yucca Mountain, which means Hanford will only be able to send a small percentage of its spent fuel to Yucca. Maynard said this is part of advice that will be coming out of the TWC.
- Shelley said another national issue is that Nevada will no longer be able to accept waste as of 2010, and there are no other low-level burial grounds. She said it will be important to address the fact that Hanford will become a bigger target. She said one strategy is the need to build more CERCLA shells. She said there is pressure from the industry to open up compact sites and build more CERCLA sites at Hanford. Maynard felt this is more of a policy issue. Shelley said there could be a possible funding incentive for opening more CERCLA cells at Hanford.
- Pam said DOE-RL has a backlog of RH TRU waste requiring packaging, treatment and size reduction prior to disposal. PBS: 0013.
- Maynard brought up the issue of infrastructure, and asked what the site's infrastructure needs are. Pam said rail going to the waste treatment plant (WTP) has been considered. She said shipping glass logs or spent fuel to Yucca Mountain would require rail, and a long-term plan for restoring rail service is needed. Maynard suggested infrastructure be listed as a main item on the priority list, then use examples like rail to support this. Harold suggested infrastructure needs of water lines and fire departments. Maynard suggested the priority of keeping infrastructure from further deteriorating to maintain a viable, strong infrastructure system. Infrastructure is spread out among a variety of PBS items.
- Gerry said he would like to know how much money DOE has spent on litigation fighting NRDA, rather than paying the money to do it, and suggested this be part of future advice. There was opposition to this from other committee members, who said this is not the HAB's role. Shelley said there is starting to be a change in direction on this issue, with the acknowledgement that NRDA needs to be done at the beginning of the assessment. She said the Board should provide input in a positive way to support this.
- Shelley said ZP-1 pump-and-treat should be added to the priority list. She said not including this is contrary to the goal of getting off the river. PBS: 0030
- Harold said the budget is made using priorities based on assumed funding levels. He said if the Board is recommending funding certain items, it should be prepared to say what should not be funded as a result of this. Maynard said this priority list is meant to give DOE-HQ an idea of what local communities are looking for as it goes forward with future budgets. Paula said it would be most helpful for DOE to have a prioritized list. At the COTW meeting, Matt explained that Ecology's prioritized list was very easy to use, and this does not mean you choose not to fund other activities.
- Pam said she would like to support the resumption of full TRU retrieval and treatment to meet TPA M 91-42 as the RAP's first priority. Gerry said he disagrees with this, as it is contrary to the idea that getting off the river should be top priority.

- Gerry said there are items from the river corridor that are outside the current funding level, such as pump-and-treat for 100-KR-4 and 100-BC-5. Shelley said if RAP says it supports the decision to get off the river, they could then list the tasks that need to be accomplished in order to meet this goal.
- Maynard asked whether the assumptions are based on 2007. Matt said there have been updates. They were submitted for certification in summer 2007, went through a review process in fall 2007, and will be certified in January. Maynard asked how these are updated, and if this takes place as decisions are made. Matt said yes, this is the process for modifying the assumptions and the baseline.
- Keith asked if the process allows for learning experiences to be incorporated if assumptions prove to be incorrect. Matt said yes, it is a process to develop cost estimates and schedule durations that allows for feedback and updating cost models based on empirical data.
- Pam said she thinks this process will give the HAB the opportunity to raise questions at a later date. She said she heard from DOE-ORP at the TWC meeting that they do not think it will be economical to use bays two and three of the storage building, but on DOE-RL's assumptions it says these may be used for K Basin sludge. Matt said an alternative analysis of how to get sludge out of the basin is needed. He said the CSB is one option being considered.
- The discussion formulated the following initial set of priorities:
  - Support resumption of full TRU retrieval and treatment to meet TPA M 91-42 (PBS 13)
  - Remote-handled capability to address 618-10,11 (PBS 13)
  - Package, treat, and reduce the size of RH TRU M91 (PBS 13)
  - Infrastructure – rail, roads, etc. in place to prevent further deterioration, to maintain a viable system (Integrated into a number of PBSes)
  - NRDA – Complete funding, do not separate or split (PBS 100)
  - ZP-1 pump and treat (PBS 30)
- The committee then decided that, rather than continue with a list of specific work items to prioritize, they would instead create a list of more generalized prioritization principles to take to the BCC. These main principles are:
  - Retrieve and treat all TRU Waste
  - Get off the river
  - Bias for action – Fund things that get things done on the ground
  - Maintain infrastructure to support all site functions
- The committee will forward both lists to the BCC for action. Gerry proposed that the BCC meet January 20, 2009 to develop the budget and priority advice. He asked that a RAP representative attend this meeting.
- Some “Bin” items were noted during this discussion:
  1. For advice: For NRDA, complete funding may be required by court action. May need to identify how much was spent on fighting this.

2. Need better explanation of why NRDA is split on IPL.
3. Need to acknowledge that if some items move up in funding priority, others may drop off.
4. Use “shovel-ready” language for descriptions related to the potential economic stimulus package.

### **Strategic Questions for the Obama Administration**

Susan Leckband said HAB leadership is hoping to create an informal list of questions for officials in the new administration that can be addressed when the leadership travels to the March EM Site-Specific Advisory Board (SSAB) meeting. She said this meeting will discuss technology infusion, what has taken place between technology infusion and labs, and what the expectations are for funding. Susan said prior to these meetings she looks at past advice and philosophies the Board has agreed to, but she wants to make sure all Board members have an opportunity to weigh in with additional questions and concerns

### **Committee Discussion**

- **Hanford should have someone on the committee that determines what to do with TRU waste. There is currently no representation from Hanford.** Keith said Hanford should have a representative on the committee that determines the disposal of TRU waste. He said there are two people from Rocky Flats on the committee, and Hanford has no representation.
- **What are the plans for Yucca Mountain?** Bob suggested asking the administration what its plans are for Yucca Mountain, as this will have major impacts on where Hanford is going to put its waste and how it will have to prepare glass for storage. Keith said this is an issue because if every site has to have monitored storage the costs will be significantly higher.
- **We need a new commitment to openness (baselines, public involvement, etc.)** Gerry said there is a need for a renewed commitment to openness. He cited a recent experience with trying to obtain chapter four of the Resource Conservation and Recovery Act of 1976 (RCRA), and being denied on the basis that it is considered for “official use only.”
- **Renew the commitment to provide a level of funding from “closed sites” to sites where cleanup is still underway. (Supplemental funding.)** Gerry suggested renewing the commitment to redirect supplemental funding that went to former waste sites. He said it was promised that the funding allocated to sites that had closure accelerated to 2006 would be redistributed to Hanford and other sites to finish cleanup; this has not yet happened.
- **We need to maintain our infrastructure at all sites to take care of the needs.** Maynard said it is important to emphasize the importance of maintaining infrastructure at all sites, because this has been a problem throughout DOE. Keith said letting infrastructure deteriorate to the point that it costs too much to recover creates new issues, and it is a lot cheaper to maintain infrastructure than to go back and rebuild it.

Susan invited committee members to email her any additional questions or comments.

### **Plutonium Toxicity Tutorial**

Debra McBaugh, Washington State Department of Health (DOH), gave a presentation on plutonium, providing context with radiation physics and chemistry. She said there are three main types of radiation at Hanford: alpha particles, which have a helium nucleus and are highly charged; beta particles, which have a charged electron and greater mass than alpha particles; and gamma particles, which have no mass, create electromagnetic radiation and are very energetic, with the ability to ionize an atom. Alpha particles can be stopped by a dead layer of skin, beta particles can travel meters in the air, depending on their energy, and gamma particles can travel hundreds of meters in the air. Lead and thick concrete can be used as shields for gamma particles. Radioactive elements can be hazardous to human health in four ways: ingestion, inhalation, contamination of wounds and direct radiation. For inhalation and ingestion, plutonium is more dangerous than the other chemicals present at Hanford. Direct radiation exposure is mainly caused by gamma radiation. Another consideration is how long radioactive material stays in the environment, which is measured in half lives, or the amount of time it takes for half of the material to decay. Debra said Pu-239 and Pu-240 have long half lives, approximately 2,000 years, and Pu-238 has less than a 100-year half life.

Jerry Yokel, Ecology, gave a tutorial on the toxicity of plutonium. He said plutonium can be identified by its radioactive properties, and inefficiencies in its production at Hanford have led to its role as an actinide metal, which is difficult to isolate. As a result, only 80 percent of the plutonium in metal form was accounted for, which has led to cleanup issues. Plutonium has seven allotropes, or crystalline forms, and five isotopes, and is defined by the exposure of the 5f electron orbitals. Plutonium has six oxidation states, and up to four can exist simultaneously in one solution. This increases its reactivity, and is why it is so difficult to isolate. Plutonium is the only chemical with six allotropes, and the energy levels of these allotropic phases are close to each other, which makes it extremely sensitive to changes in temperature, pressure or chemistry. Plutonium expands when it solidifies and undergoes self-irradiation, which results in the byproducts of other actinides and helium.

Jerry said because of the reactive and complex nature of plutonium, there are important considerations when looking at the environment. The varying pH levels in groundwater, oceans, rain and streams can change its oxidation state, which can turn plutonium into a solution that reacts with another material. Jerry also explained that plutonium can attach to and be transported by colloids, which are small particles of sediment or soil that can escape into groundwater. As far as remediation for plutonium in the soil at Hanford, Jerry said salt distillation only takes care of one form of plutonium, so all of it must be converted to that form. He said toxic effluents can be created when doing remediation. The exposure route and chemical form of plutonium are important, and Jerry said at Hanford few people were affected by plutonium because there was such a fear of its radioactivity.

Tony James, WSU, discussed the amount of plutonium that a person would need to ingest to do any harm. Tony said handling plutonium was expected to be hazardous because, when it first began to be used industrially for luminizing instruments, factory workers experienced serious complications from their exposure, and a large number of them died from bone cancer. Radium is soluble, and one-fifth of the amount of radium a person ingests goes into their body. The increase in the rate of bone cancer was observed to take place only after a high dose had been ingested. The United States Department of Labor then created regulations on the permissible amount of exposure for workers, determining the maximum permissible body burden (MPBB) for radium as 0.1 micro curie, a standard that was carried over to plutonium.

The United States Atomic Energy Commission set up a registry to track plutonium workers, to serve as a national focal point for the acquisition and provision of the latest and most precise information about the effects of TRU elements on man, and using clinical and epidemiological methods to determine whether plutonium exposure has an adverse effect on health or longevity. Registrants of the United States Transuranium and Uranium Registry (USTUR) are self-selecting, and were involved in accidents that caused them to have higher exposure than other workers. Most registrants have also been exposed to industrial toxic materials, such as beryllium, asbestos, toxic chemicals, or organic solvents, in addition to plutonium or uranium. A searchable database of USTUR was created, which ranks participants in order of the degree to which exposure contributed to their death. The average age of death for deceased USTUR registrants is between 70 and 80 years, and the average total effective dose is the equivalent of eight years of exposure at the maximum dose level. Malignant neoplasms are the primary cause of death in USTUR registrants, and incidences of other types of cancer in registrants have been calculated and compared to the rates of the general population. Preliminary findings on USTUR registrants have concluded that there is no association between exposure to TRU radionuclides and malignant cancer as the primary or secondary cause of death.

### *Regulator Perspectives*

- Ginger asked whether, when moving materials out of the Plutonium Finishing Plant (PFP), it is more dangerous to handle these at certain temperatures. Jerry said yes, that is correct.

### *Committee Discussion*

- Dick asked what the basis for comparison is when discussing the hazards of different chemicals, and whether this was measured in curies per gram or in another way. Debra said this is based on the annual limits of intake, a quantity that came from regulations. The activity amount is measured in micro curies, but the hazards are compared in relative dose per unit, which is relative to one unit of activity.
- Pam asked whether cobalt-60 is in the graphite cores of reactors, and if this is why 75-year roofs are being placed on the reactors. Debra said yes, this is the case.

- Bob asked whether there are fact sheets on each radioactive element on the DOH website. Debra said yes, there are many on the website, which is at [www.doh.wa.gov/ehp/rp](http://www.doh.wa.gov/ehp/rp).
- Gerry stated that it has been said plutonium in the soil at Hanford does not move, but because of its chemical properties it changes structures and isotopes, and it is in fact transportable and can be spontaneous. Jerry said this is correct, and is something to be aware of and monitor during cleanup.
- Maynard asked whether there is current research underway on the aging properties of plutonium, which are poorly understood. Jerry said there has been some research on this issue.
- Keith said storing plutonium is an intensive process, and it is important to keep track of what is going on with it. Jerry agreed that this is important.
- Pam said Jerry's presentation raises her concern about PW-1, 3 and 6.
- Harold said there were deaths caused by plutonium ingestion that took place in the United Kingdom a few years ago, and asked whether that was from a large amount of exposure. Tony said that was caused by the ingestion of a huge amount, equivalent to about one grain of sand. He said this death was not caused by cancer, but the acute dosage, which had a high impact.

### **100-K Area Integrated Initiative**

Bob said the committee had a briefing on the 100-K Area integrated initiative several months ago, which mainly addressed the issue of sludge. The committee asked for a presentation on the team's path forward, and found out they had created an initiative to address the sludge and the basins.

Tom Teynor, DOE-RL, is the federal project director for the 100 Area and K Basins Remediation project. He gave a presentation on this initiative, which is comprised of three projects: continued operations of the K Basins, D & D, and the sludge treatment project.

The K Basins are the largest source of contamination that is still on the river, and Ecology and EPA have expressed concern that they are located only 400 yards from the river. Tom said the initiative provides a roadmap for getting out of the basin as quickly as possible. The yellow area shown on page three of the handout "100 K Area and K Basins Remediation" depicts the areas that would be cleaned up by 2012. This is based on the current funding profile, and Tom said if economic stimulus money became available it would be spent on reducing the footprint as much as possible. He said technology for sludge treatment would have to mature, and DOE would accelerate the testing program. The green area on the diagram is K-East, which includes a trailer in the southeast corner that would house engineers, and is expected to be done by July 31, 2013. The red area indicates facilities that are tied to the treatment of sludge in K-West basin.

Tom said in order to reduce the area's footprint, a skid-mounted water treatment plant would be necessary, which would bring in water from the river to K-East, and would then be transferred to K-West. The focus is to reduce the footprint, get to the soils under the basins, and address the chromium plume, potentially through the use of bioremediation. Bioremediation causes bacteria to use oxygen and transfer to a more stable form of chromium, which would then be treated. Tom said the established milestone for completion of this is September 30, 2012. The TPA milestone negotiations for the K Basin are underway, and a tentative agreement (TA) has been reached at the Unit Manager level. Tom said the TA will now be routed for approval by DOE-RL, EPA and Ecology. The proposed milestones represent a comprehensive approach to achieve 100-K Area cleanup.

Tom said since last January DOE has reviewed 37 studies on sludge and how to approach sludge treatment. He said eight months of study and two one-week workshops using independent industry experts were conducted to analyze the alternatives to disposition sludge, including treatment at 100-K or storage at the 200 Area. In November, the contractor decided to support Option 6T, which includes two phases: moving sludge to the Central Plateau and treating and packaging sludge for eventual disposal at the Waste Isolation Pilot Plant (WIPP) in New Mexico. T Plant is a known, feasible option for interim storage. Going forward, DOE-RL will review the Alternative Analysis Report, and the Federal Project Director will select an alternative with guidance from EM-HQ.

Tom said there is a four-phase study of knock-out pots that is currently underway, which has included temperature readings, radiation readings, and samples collected from the top of the pots. From this, it was determined that metal would need to be oxidized for transportation and for long-term interim storage. Tom said the first two phases of the study are done, and the third phase is a size and density study to determine what materials are left. He said a large portion of the materials may be aluminum and iron, but by sorting it can be determined how much uranium metal, and possibly plutonium, may still be left. This would provide an estimate for the number of multi-canister overpacks (MCOs) that would be needed for long-term interim storage. The fourth phase of the study includes a size-and-density sort, which would look at three fields: the debris field, separate debris and the coarse fraction. After successful completion of this study, Tom said the material would be re-evaluated and labeled as nuclear waste scrap. Anything other than RH TRU waste cannot go to WIPP. Tom said the ultimate goal for the ROD is to get the material off site.

Tom said the moving the sludge off the river sooner will result in a possible five-year, \$100 million dollar savings. Additionally, it would allow DOE to get at the soil and contamination beneath the basin. Top 10 demolition of K-East basin will start in the next two weeks.

### *Committee Discussion*

- Bob asked which contractors are doing the work on this initiative. Tom said the milestones were negotiated by contract. One milestone is M16-00C, which includes

the area inside the fence, and another is M16-00, which includes complete remediation of 100 Area outside of the fence. Tom said CH2M HILL Plateau Remediation Company (CHPRC) is the contractor for the area inside the fence's perimeter, and Washington Closure Hanford, LLC (WCH) is the contractor of the outside area. He said so far there has been good cooperation between the two contractors, including sharing resources and freely exchanging information. Tom said DOE devised a list of waste sites that would stay with WCH and some that would be transferred to the CHPRC contract, as CHPRC's contract goes two years longer than WCH's. He said since sludge is an unknown quantity, this work scope was removed from the WCH contract and put into CHPRC, and this was the way CHPRC was bid.

- Maynard asked if the milestone negotiations are based on this moving forward. Tom said yes, everything DOE has done is tied to negotiations, and it is working closely with Ecology and EPA. He said these agencies understood DOE wanted an integrated approach to the 100-K Area, and taking the work scope for M34 to M16 acknowledges the technical challenges DOE faces. Tom said by March 31, 2011, a remediation natural work plan and new milestones will be proposed to EPA and Ecology, which by then will have a certified baseline for the life of sludge treatment and other remediation activities that go beyond 2011.
- Keith asked if DOE is confident it will have solved the technical issues for immobilizing sludge. Tom said that is DOE's hope.
- Paula said all major milestone changes go through a public comment period. Tom said it is usually a 45-day comment period associated with this process.
- Maynard asked whether there is an aspect of this project that could be started right away if money came through the economic stimulus package. Tom said work would be started later down the line, as it would require a ramping up of the training process and D & D work. He said training could begin immediately. In the two-phase approach, more testing could be completed and the phase-two treatment process could begin to look at more long-term solutions that have large up-front planning costs. He said economic stimulus funding could also look at combining these efforts with other needs on site, such as the RH TRU waste project. He said getting this area to an interim safe state would allow DOE to take a broader view of the project.
- Bob asked whether there is a plan for determining how to process the sludge once it is moved to the Central Plateau. Tom said that is a valid concern, which is why this is being done on an interim basis. He said the treatment would be oxidation, and the intent is to get it off the river using a sludge transport storage container (STSC). Tom said STSCs allow sludge to be stored outside, but the canisters are designed so sludge can be easily removed. STSCs would have multifaceted uses, and doing in situ inside the canisters has been considered. Tom said this is not conditional, and once phase one is completed phase two will be developed. The technology that will be developed will either be a modular multipurpose facility or a hazard category three facility that minimizes the amount that goes through the facility, but would be easier to build and maintain.

- Keith asked whether the Canister Storage Building (CSB) would be used for storage. Tom said the CSB would only be used to store the coarse fraction that will come off the knock-out pots. He said phase four of the testing will provide a better idea of how much of the facility this will use.
- Dick asked whether MCO will be used exclusively for knock-out pot contents, and Tom confirmed that this was true. Dick asked how many cans would be used. Tom said 25 to 30 is the current estimate. He said this program is based on lessons learned, such as the failure of the previous design due to its ventilation system.
- Bob asked about the found fuel that was moved to the K Basins from the H and F reactors, and whether a MCO with this found fuel has started to be packed and dried out. Tom said last year three loads of found fuel were removed from WCH, and the primary way of handling found fuel is dry storage outside of the CSB. He said DOE is limited by the surface area of an attached fuel element, and although the capability is there, this needs to be budgeted and planned for. Tom said the fuel line will be deactivated as soon as the knock-out pot initiative is complete.
- Keith said he has heard complaints about the robustness of the machinery in K Basin, and asked whether this was being taken into consideration. Tom said it is being considered, and operators came into the last workshop to address this issue.
- Maynard asked whether these efforts are being coordinated with WIPP. Tom said WIPP representatives were involved in both workshops, and DOE is doing everything possible to make sure materials comply with its waste acceptance criteria.
- Dirk said one presumption of this is that the sludge can be transported to the center of the site. He said last time this was attempted, the hydrogen that was boiled off created issues. He asked whether there was a solution to this. Tom said DOE was considering in-basin oxidation, but this added three years to the schedule, and an independent review did not approve it. He said this will be part of the design criteria and the project will not go forward until this mechanism is understood. Tom said there was not a lot of gas generation in the material being sent to the Central Plateau, and the greatest gas generation has been from the knock-out pot stream. Roger said hydrogen technicality is a concern, and there is a plan to conduct a sampling characterization campaign for sludge in all of the engineer containers that will be transported to the Central Plateau in order to handle the hydrogen generation issue.
- Dick said the sludge transport containers that will have to be loaded out of the basin are still being designed. He asked whether there is any virtue in storing those in the empty bays at the CSB. Tom said he would have to see how that would impact the project's operations. He said the defense plant approved it for storage, but this would not allow operations or treatment. Four cells of the CSB have been cleaned out and configured, and an additional six or seven could be available. Tom said there is also a founding condition on cost, and DOE is looking at either a new facility or pad-like storage. The retrieval system developed to put material into the transport containers would be same as to get it out. He said the project may not go with the grouting mechanism, and instead would de-water the grout as much as possible as soon as it was oxidized, then find a way to crush it. He said time and money would be invested

in upfront planning and testing so that this can be done with a high level of confidence.

- Dick asked where the facility transfer to the storage facility would be made. Tom said this will require designing a crane mechanism, which is part of phase two of the process. Keith asked whether the crane system would be similar to that at the CSB, and Tom said it would.
- Maynard asked Tom to return to the committee when updates would be useful, and when the change package is ready for public review and comment.

### **Action Items / Commitments**

- Paula will speak to Boyd Hathaway to let him know the committee would like an update from him on ICs and LTS.
- Margery, Dick and Debra will coordinate the development of a condensed version of plutonium presentation for the April Board meeting.
- A BCC meeting to work on advice and further discussion of assumptions will take place Tuesday, January 20 at 1:30 p.m. Maynard will represent RAP at this meeting.
- Follow-up topics for future meetings:
  - CW-5, which is part of the new draft Change Package (March)
  - Central Plateau Pathway (March)
  - Incorporating the costs of ICs into RODs, and developing advice (March)
  - New IC advice (March)
  - ZP-1 (April or May)
  - ROD (May)
  - Update on the status of the 16 actions state in the 2003 LTS plan
  - Update on the 100-K Area initiative
  - Provide potential advice on the 100-K Area, and review the Change Package once it is publicly available
  - 2015 workshop
  - Contract integration

### **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)*

- Summary of Hanford Advisory Board (HAB) Principles on Institutional Controls (IC) and their impact on the Long Term Stewardship (LTS) of the Hanford Site as Delineated in Prior Consensus Advice, Bob Suyama, January 8, 2009.
- Transmittal Letter for IC & LTS White Paper, Bob Suyama, January 8, 2009.
- EM Engineering & Technology: Groundwater and Soils Remediation Program, Terri Stewart, January 8, 2009.

- Office of Science/Environmental Remediation Sciences Division (ERSD) Supported Research at Hanford: The PNNL Scientific Focus Area (SFA) and Integrated Field Research Challenge (IFRC), John M. Zachara, January 8, 2009.
- Richland Operations Office EM Project(s) Baseline Summary, DOE-RL, June 2008.
- Richland Priority List: FY 2010, DOE-RL, January 8, 2009.
- Project Assumptions, DOE-RL, January 8, 2009.
- Plutonium (Pu) Fact Sheet #28, Washington State Department of Health, November 2002.
- Plutonium Facts, Figures & Hazards, DebraMcBaugh, January 8, 2009.
- Plutonium Toxicity Tutorial, Jerry Yokel, January 8, 2009.
- ICP-MS Studies of Plutonium in the Environment, Michael E. Ketterer, November 2005.
- Two Especially Critical Whole-Body Donation Cases in March, USTUR, March 26, 2008.
- 100 K Area and K Basins Remediation, Tom Teynor, January 8, 2009.
- Map of 100 K Area, Tom Teynor, January 8, 2009.

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**Attendees**

**HAB Members and Alternates**

Shelley Cimon	Larry Lockrem	Dick Smith
Dirk Dunning (on phone)	Vince Panesko	Keith Smith
Harold Heacock	Gerry Pollet	Bob Suyama
Pam Larsen	Maynard Plahuta	Margery Swint
Susan Leckband		

**Others**

Paula Call, DOE-RL	Rick Bond, Ecology	Steve White, Columbia River Keeper
Matt McCormick, DOE-RL	Melinda Brown, Ecology	Janice Williams, CHPRC
John Morse, DOE-RL	Nancy Uziemblo, Ecology	Barbara Wise, CHPRC
Roger Quintero, DOE-RL	Ginger Wireman, Ecology	Rico Cruz, CTUIR
Francis Roddy, DOE-RL	Jerry Yokel, Ecology	Barbara Harpo, CTUIR
Tom Teynor, DOE-RL	Craig Cameron, EPA	Mike Keizer, CWBCTC
Arlene Tortoso, DOE-RL	Dennis Faulk, EPA	Debra McBaugh, DOH
Geoff Tyree, DOE-RL	Emerald Laija, EPA	Mike Priddy, DOH
		Susan Hayman, EnviroIssues
		Molly Jensen, EnviroIssues
		Michele Gerber, Flour Hanford
		Stan Sobezyk, Nez Perce ERWM
		Maria Freshley, PNNL
		John Fruchter, PNNL
		Mark Triplett, PNNL
		Terri Stewart, PNNL
		Dawn Wellman, PNNL
		John Zachara, PNNL
		Annette Cary, Tri-City Herald

		Gary Petersen, Tridec
		Fred Mann, WRPS
		Tony James, WSU/USTUR
		Stacey McCord, WSU/USTUR
		Sergei Tolmachev, WSU/USTUR
		Wade Rezzbee, YN