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Meeting Minutes for the WMA C PA Working Session on Soil Inventory

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Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-08RV14800

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Key Words: Waste Management Area C, Performance Assessment, tank closure, waste inventory

Abstract: Summary of meeting between DOE-ORP and Hanford Site regulators/stakeholders regarding Waste Management Area C performance assessment. The meeting minutes consist of roster of attendees, summary notes take at the meeting and content of flip charts used during the meeting.

Nancy A Fouad 3-1-10
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Meeting Minutes

Waste Management Area C Performance Assessment
Soil Inventory Working Session

held at
Washington State Department of Ecology Offices
3100 Port of Benton Boulevard
Richland, WA 99352

on
October 26-28, 2009

LIST OF TERMS

AR	Water washed PUREX sludge entrained in decants of recovered sludge or water washes of this sludge and the solids remaining after acidification (1967-1976)
BL	B Plant low-activity waste (1967-1976)
COPC	Contaminant of Potential Concern
CWP1	PUREX cladding waste, aluminum clad fuel (1956-1960)
CWP2	PUREX cladding waste, aluminum clad fuel (1961-1972)
CWZr1	PUREX (and REDOX) zirconium cladding waste (1968-1972)
DOE	U.S. Department of Energy
DOE-ORP	DOE -Office of River Protection
DOE-RL	DOE Richland Operations Office
DOE-HQ	DOE-Headquarters
Ecology	Washington State Department of Ecology
FEPs	Features, Events, and Processes
HS	Hot Semiworks strontium and rare earth purification waste (1961-1968)
NRC	U.S. Nuclear Regulatory Commission
OWW1	PUREX organic wash waste and non-boiling waste (1956-1962)
P1	PUREX high-level waste (1956-1962)
P2	PUREX high-level waste (1963-1967) and acid waste to B-Plant (1964-1972)
PA	Performance Assessment
PSN/P2	PUREX supernate waste
PUREX	Plutonium-Uranium Extraction (Plant)
SRR	High activity waste from B Plant processing of PUREX acidified sludge, solids centrifuged from AR vault feed, strontium purification wastes after solvent extraction, and rare earth carrier precipitation or ion exchange rework wastes (1969-1985)
TBP	Tributyl phosphate process waste
TH1	Thoria process wastes (1966)
TH2	Thoria process wastes (1970)
UPR	Unplanned Releases
WMA C	Waste Management Area C

Attendees: Meeting attended by representatives (See roster below) from Department of Energy-Office of River Protection (DOE-ORP), DOE Richland Operations Office (DOE-RL), DOE-Headquarters (DOE-HQ), the Washington State Department of Ecology (Ecology), the U.S. Nuclear Regulatory Commission (NRC), State of Oregon, and representatives of the Nez Perce Tribe and Confederated Tribes of the Umatilla.

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Agenda for WMA C PA – Soil Inventory	
Oct. 27	**FEPS Discussion and Process History**
8:00 AM	Refreshments
8:15 AM	Introductions
8:45 AM	Goals and Objectives of Soil Inventory Working Session (S. Eberlein)
9:00 AM	FEPs Process (C. McKenney, NRC)
9:30 AM	Break
9:45 AM	FEPs Process (C. McKenney, NRC) continued
10:00 AM	DOE Perspective (M. Letourneau, DOE-EM)
10:15 AM	Ecology Perspective (Ecology Staff)
10:30 AM	FEPs (Open Discussion and Q/A)
11:00 AM	PA-Related Terminology
11:30 AM	Lunch
12:45 PM	Background on WMA C (C. Kemp, ORP)
1:15 PM	Process History (M. Johnson, CH-PRC)
2:15 PM	Break
2:30 PM	Process History (M. Johnson, CH-PRC) - continued
3:30 PM	Process History (Open Discussion and Q/A)
4:00 PM	Adjournment
Oct. 28	**Soil Inventory Estimation Process and Results**
8:00 AM	Refreshments
8:15 AM	High-level Approach to Estimate Soil Inventories (L. Fort, Ecology)
8:45 AM	Detailed Process to Estimate Inventory of Releases to Soil (J. Field, WRPS)
9:30 AM	Break
9:45 AM	Detailed Process to Estimate Inventory of Releases to Soil (cont.)
10:30 AM	Soil Inventory Estimation Process (Open Discussion and Q/A)
11:00 AM	Inventory Estimates for Individual Releases (J. Field, WRPS/M. Wood, CH-PRC)
11:30 AM	Lunch
12:45 PM	Inventory Estimates for Individual Releases (J. Field, WRPS/M. Wood, CH-PRC) (cont)
2:30 PM	Break
2:45 PM	Discussion of Uncertainty (J. Field, WRPS/M. Wood, WRPS)
3:15 PM	Soil Inventory Uncertainty (D. Dunning, Oregon Department of Energy)
3:45 PM	Discussion and QA
4:00 PM	Adjournment
Oct. 29	**Final Discussions and Closeout**
8:00 AM	Refreshments
8:15 AM	Future Soil Releases (J. Field, WRPS)
8:45 AM	Evaluation of COPCs and Future Characterization (M. Connelly, WRPS)
9:30 AM	Break
9:45 AM	Soil Inventory Estimates and COPCs (Open Discussion and Q/A)
10:15 AM	Review of Consensuses
11:00 AM	Review of Notes
11:30 AM	Lunch
12:45 PM	Working Session Feedback
1:00 PM	Forward Look to Man-Made #1 and Other Future Sessions
1:30 PM	Other Issues and Comments

Discussion: DOE is pursuing closure of Waste Management Area C (WMA-C) located at the Hanford Site. At some point in the future, DOE and NRC will consult on waste determinations for these tank closures; additionally these tanks will be closed in coordination with EPA and Ecology in accordance with the Tri-Party Agreement and State-approved closure plans. The DOE, NRC, EPA, and Ecology met for the second of a series of technical exchanges on the proposed inputs for a WMA-C Performance Assessment (PA). The technical exchanges are intended to capitalize on early interactions between the agencies with a goal of developing DOE's WMA-C PA. Technical discussions during the meeting are intended to allow for the clarification of general modeling approaches and for the identification of other specific questions.

Topics: The following specific topical areas were discussed during the meeting:

1. Goals and Objectives of Soil Inventory Working Sessions
2. Features, Events, and Processes (FEPs)
3. Performance Assessment Related Terminology
4. Background on WMA C
5. WMA C Process History
6. High-Level Approach to Estimate Soil Inventories
7. Detailed Process to Estimate Inventory of Releases to Soil
8. Inventory Estimates for Individual Releases
9. Discussion of Uncertainty
10. Soil Inventory Uncertainty
11. Future Soil Releases
12. Contaminants of Potential Concern (COPCs)
13. Soil Inventory Estimates and COPCs Discussion
14. Review of Consensuses, Notes, Working Session Feedback
15. Forward Look to Man-Made Systems (1) and Other Future Sessions
16. Other Issues and Comments

PDF handouts of the actual slides from two presentations provided in the working session are provided at the following location on WMA C Working Session Web site:

http://wir-workshops.wrpstoc.com/sessions/october_27-29_soil_inventory/category/documents

Inventory Estimates for Waste Released to the Soil in WMA C
Presentation by Dr. Dunning on Uncertainty

Summary: The following summarizes the discussion during the meeting, by topical area.

Goals and Objectives of Soil Inventory Working Sessions

- DOE-ORP Staff provided an overview of the soil inventory working session and the topics that would be addressed during this working session, including the universe of information that is available and the uncertainties associated with that information. The overall working schedule for these sessions was presented, along with some potential changes to the order of sessions based on work progress.

Features, Events, and Processes (FEPs)

- NRC Staff provided an overview of the use of the FEPs process in developing a performance assessment and how the NRC Staff typically views and uses FEPs. NRC Staff expects that the FEPs list should include all the FEPs that have a potential to influence the disposal system performance, including both the natural and man-made system, and provide a documented rationale for why certain things are modeled and others are not.

- NRC Staff noted that FEPs includes both current and future FEPs, and should use information about disposal site characterization data and description of modes of degradation of engineered barriers.

- NRC Staff discussed a variety of ways that FEPs may be generated and documented. NRC staff noted that it is helpful to have a structure or categories of FEPs to facilitate assessing the completeness of the FEPs considered.

- NRC Staff discussed process for screening FEPs to determine what FEPs are important to model and which are not. NRC Staff indicated that FEPs can be excluded if they are demonstrated to have no significant impact on the timing or magnitude of impacts, but that a justification or technical basis for exclusion should be documented and that documentation should be both transparent and traceable.

- NRC Staff provided examples of FEPs and discussed what aspects of each example were well done and what aspects would require additional effort.

- NRC Staff discussed how FEPs are used to develop scenarios or connected sequences of FEPs that outline possible future conditions of a site. NRC Staff noted that these scenarios are not the traditional exposure scenarios, but instead are descriptions of future land uses, human activities, and behavior of the natural and man-made systems as related to a future human receptor.

- NRC Staff discussed alternative methods for scenario development, including judgmental, event tree, and systematic (top-down and bottom-up) methods.

- NRC Staff noted that the comprehensiveness should be judged against a record of continuous and open reviews, recognizing that performance assessment is an iterative process. As a result of future reviews or new information, a FEP that was previously excluded may be included, or vice versa. It was also noted that the level of detail should be commensurate with the complexity of the situation.

- DOE-HQ Staff provided their perspective on the FEPs process and stressed the relationship between having the right FEPs and having an appropriate site conceptual model. DOE-HQ Staff noted that whether the FEPs are documented extensively or not they represent lines of inquiry that reviewers of a PA will inevitably use.

- DOE-HQ Staff noted that it is important to decide what the working sessions should address regarding FEPs.

Performance Assessment Related Terminology

- The facilitator led a discussion among the meeting participants about what a conceptual model is and how it includes all the features, events, and processes at a site. It was noted that it is important to understand waste, waste form, and site characteristics.

- Participants stressed that the conceptual model is not quantitative, does not discuss parameterization or modeling codes, and integrates man-made system with natural systems.

- Participants discussed different approaches to developing conceptual models and pros and cons of conceptual models.

- NRC Staff stressed the importance of also considering alternative site conceptual models.

Background on WMA C

- DOE-ORP Staff provided an overview and update on the status of WMA and its current conditions. Tank wastes being retrieved from WMA C are piped up to the double shell tanks in the AN Tank Farm. A review was also provided of the WMA C single shell tank design characteristics.

WMA C Process History

- DOE-RL Staff provided a history of the processes that generated waste that went to WMA C, including waste from the B Plant Bismuth Phosphate Process (1944-1956), the Uranium Recovery and Savaging Waste (1952-1958), Plutonium-Uranium Extraction (PUREX) Plant process waste (1956-1990), and Cesium and Strontium Recovery waste (1961-1985).

- DOE-RL staff provided an overview of each of these major processes and the wastes generated by these processes.

- DOE-RL Staff described that the Bismuth Phosphate Process wastes included MW1 – BiPO4 metal waste (1944-1949), and 1C1 – First cycle decontamination waste and coating waste (1944-1949).

- DOE-RL Staff described that the Waste Scavenging Process waste included pH adjusted waste (from adding sodium ferrocyanide, Nickel Sulfate, and Calcium Nitrate) and precipitates (cesium nickel, ferrocyanide, and strontium sulfate).

- DOE-RL Staff described that the Uranium Recovery waste included TBP – Tributyl phosphate process waste (1952-1957) and TFeCN – Ferrocyanide sludge from supernatant scavenging in 244-CR vault consisting of TBP supernatant and the commingled supernatants from other wastes stored in the same tanks (1955-1958).

- DOE-RL Staff described that the PUREX Process Waste included CWP1 – PUREX cladding waste, aluminum clad fuel (1956-1960), CWP2 – PUREX cladding waste, aluminum clad fuel (1961-1972), CWZr1 – PUREX (and REDOX) zirconium cladding waste (1968-1972), P1 – PUREX high-level waste (1956-1962), P2 – PUREX high-level waste (1963-1967) and acid waste to B-Plant (1964-1972), OWW1 – PUREX organic wash waste and non-boiling waste (1956-1962), TH1 – Thoria process wastes (1966), and TH2 – Thoria process wastes (1970).

- DOE-RL Staff described that the Cesium and Strontium Recovery Waste included HS – Hot Semiworks strontium and rare earth purification waste (1961-1968), AR – Water washed PUREX sludge entrained in decants of recovered sludge or water washes of this sludge and the solids remaining after acidification (1967-1976), BL – B Plant low-activity waste (1967-1976), and SRR – High activity waste from B Plant processing of PUREX acidified sludge, solids centrifuged from AR vault feed, strontium purification wastes after solvent extraction, and rare earth carrier precipitation or ion exchange rework wastes (1969-1985).

- DOE-RL Staff also presented a correlation of the waste processing history with each series of tanks in WMA C and the years each waste type was sent to each tank.

High-Level Approach to Estimate Soil Inventories

- DOE-ORP Staff provided a general introduction to the soil inventory topic and what would be presented by subsequent presenters.

- Ecology Staff provided an overview of the approach to inventory estimating that has been agreed to with DOE and how the information flows between the organizations in an iterative way.

Detailed Process to Estimate Inventory of Releases to Soil

- DOE-ORP Staff provided an overview of the confirmed or assumed past leaks, major unplanned releases, and other releases that will be discussed.

- DOE-ORP Staff provided an overview of the process used to estimate the inventory of past releases.

- Meeting participants discussed variations in approaches that have been used at the site for estimating volumes and source terms associated with different releases, e.g., tanks versus waste sites.

- DOE-ORP Staff discussed three methods that were used to estimate leak volumes: (1) based on process documents; (2) determined from measured liquid level decreases; and (3) based on vadose zone cesium measurements.

- DOE-ORP Staff provided background information on example unplanned releases from the past that have been documented and some of the challenges associated with trying to determine causes. For example, measured tank liquid level decreases could be associated with leaks, spare inlet overflows, measurement errors, evaporation, or other operational changes not related to an actual release.

- DOE-RL Staff described the cesium scaling method used to estimate some releases, which was a method used to estimate a leak volume if no other documented estimate existed, no liquid level decrease was observed, or liquid level decrease was not attributed to liquid loss to the soil. In this case, the volume is calculated based on the estimated mass of cesium and concentration in the waste released.

- DOE-RL staff provided examples of how the cesium scaling method is used and demonstrated its general effectiveness.

- DOE-ORP Staff discussed other methods for estimating leaks. Estimation of the date of a leak may be more difficult to determine for small leaks than larger leaks because there is less information available to corroborate estimates. Small leak estimates, therefore tend to be based on drywell date only. It was also noted that leaks may have occurred well before drywell measurements were obtained and therefore may not be able to be dated accurately.

- DOE-ORP Staff discussed how little data is available about composition from tanks or tank leaks directly from at the time of the leak and therefore must be estimated by other means. Composition of a leak was estimated based largely on historical models, e.g., fuel burn up rates, ORIGEN. It was also noted that waste composition in tanks changed over time and therefore process records are used to identify different waste types and waste transfers over time.

- DOE-ORP Staff discussed the basis for chemical constituent and radiological constituents identified in the Hanford Soil Inventory Model.

- Meeting Participants discussed the uncertainties associated with constituents that have been sampled in the past and are assumed to be risk drivers today.

Inventory Estimates for Individual Releases

- DOE-ORP and DOE-RL Staff provided examples of how detailed process for estimating soil inventories was applied to specific examples in the WMA C for known and suspected spills, including Tanks C-101, C-105, C-110, C-111, and Un-Planned Releases (UPR) 81, 82, and 86.

- DOE-ORP Staff provided data associated with the C-101 release, which had previously been estimated to be 36,000 gallons of PSN or P2 PUREX supernate waste based on an observed liquid-level decrease between January 1965 and September 1969. Results of current reanalysis indicates either a smaller volume leak actually occurred or not PSN waste. Conclusion, pending additional field investigations is a release of approximately 4,000 curies of cesium (5,000 gallons) or a leak of 20,000 gallons of condensate with a much lower inventory.

- DOE-ORP Staff provided data associated with the C-105 release, which had previously been estimated to be 2,000 gallons based on dry well measurement calculations in 1969. Results of current reanalysis indicates probable cesium inventory of 4,150 curies at 2,000 gallons and a possibility that the size of the release may have been smaller.

- DOE-ORP Staff provided data associated with the C-110 release. C-110 had been designated a presumed leaker in 1977 based on drywell activity and a leak of less than 2,000 gallons was postulated. Results of current reanalysis indicates that there was no observed liquid level decrease in C-110, and the most probable source of the activity identified in the drywell was from overflow ports. C-110 was determined to be sound, safe to sluice, and was later reclassified as sound. A rough maximum estimate was made that no more than 2,000 gallons could have been released through the overflow ports based on the drywell activity, and likely occurred in the 1971 to 1972 timeframe when the liquid level in the tank was high. Expected inventory of the release, based on supernatant in the tank at that time, is 352 curies of cesium.

- DOE-ORP Staff provided data associated with the C-111 release, C-111 had been declared of questionable integrity in 1968, based on liquid level decreases of 8.5 inches from 1965 to 1969. Decrease corresponds to a liquid volume of approximately 23,000 gallons, however, no drywell activity or pipeline failures had been identified near C-111. Results of current reanalysis indicates that the observed liquid level decrease could be explained by evaporation in association with higher documented temperatures in the tank at the time and the rate of vapor removal associated with the exhaust fans in use with C-111 at the time. Measure liquid level decrease rates compared to the calculated evaporation rates show similar trends. Based on this reanalysis, it was concluded that there was no basis for an inventory estimate and the tank has been reclassified as sound.

- DOE-ORP Staff provided data associated with previous leak estimates associated with the C-200 series tanks, which were based on observed tank liquid level decreases from 1983 to 1987. Results of current reanalysis indicates that there is no basis to change previous estimates, and therefore the estimates using the SIM composition data (assuming P1/P2 supernatant or PSN waste type) were maintained, with a recommendation for future additional field investigations.

- DOE-ORP Staff provided data associated with UPR 81, which had previously been estimated to be approximately 36,000 gallons from a line leak from PUREX Plant to C-102. Results of current reanalysis indicates 350 curies of cesium due to the composition of the coating/cladding removal waste stream that would have been involved in the release at the time. Additional field investigation is planned.

- DOE-ORP Staff provided data associated with UPR 82, which resulted from a leaking waste line running from C-105 to B Plant in 1969. Results of current reanalysis indicates that the revised estimate of the release event should be approximately 2,100 gallons, with an estimated inventory of 4,400 curies of cesium.

- DOE-ORP Staff provided data associated with UPR 86, which had previously been estimated to be 17,000 gallons of PSS waste resulting from a leak in the PUREX supernate line between the 244 AR Vault and the 151-C diversion box in 1971. Results of current reanalysis, based on additional field investigation, indicates that revised estimate of the release event should be 11,500 curies of cesium. Additional field investigation is planned.

Discussion of Uncertainty

- DOE-RL Staff presented information concerning uncertainties associated with the soil inventory information. Uncertainties associated with sources of contamination include limitations in tank process reports and assessments, interpretations on in-tank liquid level measurements, gaps in waste transfer records, moisture monitoring data, logging data, well spacing and frequency of logging, differing results from different probe types, limited vadose zone sampling and analysis, potential for multiple contributing sources, and a wide range of data with various levels of pedigree.

- DOE-RL Staff indicated that there is not enough data to provide a basis for statistical uncertainty analysis for most releases. Most leak volumes were estimated as maximum feasible volumes based on current data. Leak concentrations based on SIM data vary by a factor of approximately 5 for most major constituents.

- DOE-RL Staff concluded that C-101 leak inventory has the largest uncertainty. Uncertainty in the C-200 volume release is high, but insignificant compared to other know releases. Further field investigations are planned to focus on reducing uncertainties. It was also recommended that risk assessments assess +/- 10 times inventories to account for concentration uncertainties.

- DOE-RL concluded that given the current known data, known current releases and UPRs do not appear to account for increasing technetium and other constituent trends in groundwater below WMA C. Other releases do exist, including: other UPRs failed pipelines, contaminated dry wells, spare inlet and line leaks, and undocumented surface spills.

Soil Inventory Uncertainty

- DOE-RL Staff presented information on additional UPRs and how they contribute to the understanding of soil inventories and uncertainties. Additional pipeline failures were also identified that have not been classified as UPRs. A failed pipeline is one that is plugged or will no longer flow as opposed to one that has leaked. It is expected that there are other historical spills that were not documented and further investigation is planned for these sites.

- DOE-RL Staff presented information supporting the conclusion that the sources of contamination at shallow depths is generally assumed to originate from releases of similar tank waste types as contributed to the larger known releases and result from historical tank farm operations. Low inventories of radiological constituents in surface contamination relative to the known tank and pipeline release inventories suggest that surface contamination is likely to have low inventories of hazardous constituents; however, there are some exceptions. The nature and extent of radiological and chemical surface contamination will be further investigated.

- The technical representative from the State of Oregon presented information on their view of the soil inventory uncertainty as related to risk assessments and noted that uncertainty in magnitude can directly drive uncertainty in risk assessments. Major sources of uncertainty identified included conceptualization, characterization sampling, sample analysis, sample bias, in situ data gathering, technique limitations, and analytical uncertainty.

- The technical representative from the State of Oregon presented examples of how errors with respect to each of these major areas of uncertainty in the past have resulted in being surprised by waste types, volumes, and locations that we did not expect.

Future Soil Releases

- DOE-ORP Staff presented the assumptions that are being made regarding future soil releases in WMA C. At this time, the only foreseen future releases in WMA C are expected to be from a leak or overflow associated with retrieval. The tanks in WMA C have all already been interim stabilized, meaning that the supernate has been removed. Additionally, all pipelines and diversion boxes have been flushed, water lines to the tank farms have be shut off, and there is no planned future use of the underground pipelines. Any future releases to the soil associated with tank waste retrievals are expected to be small.

- DOE-ORP Staff provided additional information concerning leak detection requirements for WMA C activities that are included in the Tank Waste Retrieval Work Plans.
- DOE-ORP Staff noted that tanks are sluiced with supernate from other tanks. The composition of sluicing fluid for tanks retrieved to date is about the same as AN-106 supernate, however, at this time are not planning to include an inventory estimate for future retrieval releases.

Contaminants of Potential Concern

- DOE-ORP presented an overview of the work that has been done to date on contaminants of concern. COPCs have been identified in the "Single-Shell Tank Component Closure Data Quality" document, in soil characterization reports, and in the RCRA groundwater monitoring plans.
- DOE-ORP summarized that there are 30 primary radionuclides, 33 primary and 34 secondary inorganic constituents, and 68 primary and 84 secondary organic constituents. Post-cleaning residual samples have been taken and analyzed from C-10, C-106, C-202, C-203, and C-204.
- DOE-ORP indicated that field investigation and characterization sampling are not yet completed. When completed, the results will be provided to EPA and Ecology and COPCs will be confirmed to carry forward into the performance assessment.

Soil Inventory Estimates and COPCs Discussion

- Meeting participants discussed the completeness of the COPC list. It was noted that relevant nitrosamines are reflected in the COPC list. Some questions raised concerning coordination with groundwater monitoring plans.

Review of Consensuses, Notes, Working Session Feedback

- Meeting participants discussed possibilities for alternate conceptual models and cases that should be considered in the analysis in the performance assessment. There was general consensus that alternative cases should look toward larger leak assumptions, deeper waste, faster migration, and more moisture. Several studies that have been done or are being done elsewhere at the site were suggested as possible sources of alternative conceptualizations that could be considered.
- Meeting participants discussed some of the difficulties and perturbations that need to be reflected in the analysis and the caveats that need to be kept in mind.

- Meeting Facilitator summarized that there is general consensus that: (1) we are going to try to use the FEPs process to help understand the conceptual model and ensure that correct features, events, and processes are accounted for; (2) there is definite data disconnect discomfort among the meeting participants; (3) Bounding estimates will be used; (4) there is understanding and commitment to the iterative approach; (5) we will clearly document other work to close data gaps; (6) that alternative conceptual models and cases will be used that fit what the data shows; and (7) meeting participants recognize that resource, timing, political, and regulatory constraints exist.

Forward Look to Man-Made Systems (1) and Other Future Sessions

- DOE-ORP Staff provided thoughts on the nest working session on made-made systems. DOE-ORP Staff proposed bringing in PNNL staff to present FEPs on residual tank samples, and discuss FEPs and reference and sensitivity cases related to release modeling, barrier systems, and recharge rates.

- DOE-ORP Staff also recommended that for the July cumulative impacts session, use that session to step back and look at the cumulative FEPs to that point.

- DOE-ORP Staff indicated that they are going to look into identifying an international expert on FEPs who might be available to consult with this effort.

Other Issues and Comments

- DOE-ORP Staff provided an update on resolution of comments from previous sessions.

Flip Charts from Soil Inventory Working Session, October 27-29, 2009

Conceptual Model discussion

- Scenario (of conditions) and exposure scenario should be included in glossary (slide 12 of Chris M. presentation).
- Concept not quantitative. Considers all FEPs for site.
- Ideas and shape of how the ideas work together.
- Supported by qualitative data—iterative. Data important for those conceptual models that matter.
- Storyboard description of how things work and function and move through environment—not modeling.
- Representation of what we think is going on—don't get into processes, codes, etc.—focus on the structure.
- Engineering system imposed on natural system and need to understand both.
- Conceptual models allow overall understanding of the system.
- Conceptual models should be easily understood.
- Best conceptual models are really good drawings. Makes it easier for agreement and going to next layer of questions.
- Box and arrow diagrams good representation of contaminant movement. Lots of 'plug-in' approach with previous models for exposure point concentration which biases PA to those pharmacological and biological models.
- Conceptual models must be grounded in FEPs and interaction with data.
- In the past, there was too much focus on trying to force fit into codes and that created problems. The conceptual model tells you what you need to assess. Then you find codes to do assessment. Not the other way around.
- Alternate conceptual models important to deal with uncertainties.

Alternate Conceptual Model Discussion

- One way is to overlap an event on the 'normal' conceptual model.
- Not analytical modeling.
- Alternate conceptual model is the construct that drives analysis.
- Many cases can be run (e.g. amount of rain) without changing conceptual model.
- Whether waste goes straight down or doesn't move are different cases, not different conceptual models.
- Alternate conceptual models may be needed with extreme changes in boundary conditions.
- Alternate conceptual models vs. different cases is a gray area and it is driven by degree of change of an element of the conceptual model.
- Provide examples to Mike C. of alternate conceptual model and or cases.
- Example: zero contamimination at fence and vadose zone assumption vs. data showing contamination in groundwater.
- If physics are different probably an alternate conceptual model.
- Problem is disconnect in data: The data doesn't conform to any current conceptual model.

Soil Inventory estimation process

- Why are waste sites treated differently than tank leaks? Forcing central tendency can result in problems. In this case, they only forced central tendency of volumes.
- To avoid these problems, they will use a bounding max based on data since not enough data to figure central tendency.
- C-200 tanks had big difference between estimated material balance and waste actually retrieved. This emphasizes the great uncertainty associated with tanks. This is emphasized even more for boiling or heavily used tanks.
- Slide 76: A cross-section showing the plume estimate would be helpful.
- Cesium in dry well 05-03 on other side of tank at low levels may indicate high levels near-by.
- Important to keep in mind difference between plume map and mathematical construct to calculate mass of Cesium.
- Slide 80: Uncertainty with how SST DQO uncertainties can be remedied by SIM.
- Why does list include DBP but not TBP?
- Slide 85: Drywells can only read 12 inch diameter so possible that drywells are missing the leak. Still, if P2 waste, would expect to see it.
- Slide 88: E27-14 has cobalt where did it come from? Maybe C-101 or other septic tanks?
- If leak is in center of bottom of tank, it wouldn't be detected.
- Slide 98: Make gamma logs for this slide available.
- C-111: Did Cobalt around C-108 come from C-111? Drilling some new holes to get more data related to this.
- Slide 122: Chart needs to be double checked to ensure Ci's are presented consistently (e.g. daughters).

Uncertainties Discussion

- Slide 123: Tc summary table should be added to data package.
- Slide 125: Why 10x picked to bound uncertainty? Need better discussion to support this selection.
- Don't overlook addition of water to system (e.g. testing fire hydrants, leaky water lines, etc.) Wade to forward study reference that showed 30% of 200 East water cannot be accounted for.
- Approach is a bounding case and uncertainty factor verses building a case open to sensitivity analyses.
- Matching time period with waste type is an uncertainty.
- Deep vadose zone uncharacterized and what matters is how you distribute contaminant in vadose zone in the model.
- With this level of uncertainty, regulator has to force to extreme conservatism.
- Where to spend money is an important policy question:
    - Trying to understand discrepancy?
    - Pump and treat?
    - Analyses?
- Slide 130 only a small sample of failures—only the ones they found—probably only a fraction of a percent.

- Slide 132 may only be seeing what is in the pipe. The lower Co could be a tank leak.
- Why not collect data until you understand system—then do the Performance Assessment? The Consent decree is driving schedule.
- Conceptual model needs to acknowledge what you know.
- Slide 145: Should include inventory estimate for future retrieval releases (Ecology concern). At least assume the limits of leak detection. Need to consider worker risks, surface release issues, etc.

COPCs Discussion

- Any items used at Hanford that analytical techniques don't detect (Galidium??)
- Additional COPCs should be forwarded to Mike C. for consideration of updating the DQO.

Alternate Conceptual Model examples for Mike

- Layer of perched water flows past C farm in opposite direction from groundwater.
- Bigger leaks (max about 50k gallons), faster migration, more water, and deeper waste.
- Center of mass and shape of plume for models important. Assumptions for simulating leak also impact results.
- Jeff S. and Bruce B. work on BX/BY plumes could help understand alternate conceptual models.
- Other preferential paths (boreholes) chronic water discharges, large single event discharges. Artificial recharge is important.

What decisions does the PA support?

- One PA (TPA App I requirement) to cover all needs.
- Help outline future data needs and support decisions.
- Need swimlane chart on wall during sessions.
- Reasonable set of assumptions and alt cm/cases.
- Be careful with stacking conservatism or you can end up spending resources on risks that don't really exist.
- Do reasonable assumptions and communicate clearly.
- UPRs and others are just those found—only a small slice.
- How is undeteced unknown releases represented by 5x? What is the basis for this assumption?
- Assumption that 'the rest' is less than documented leaks should be better supported.
- 'Unplanned release' needs to be included in glossary (vs. 'leak' definition).

Man-Made systems

- Someone to talk operations? Do that in Man made 2.
- 1854 not a FEPS users manual. High level overview only.
- Cross-section of tank bottom for session would be useful.
- Water budget for surface barriers.

- Revisit at each session the issue of where cumulative impacts session fits.
- Rename ‘dosimetry’ session as ‘exposure scenarios.’
- Should a future session include a clastic dike field trip?
- Include glossary in data package.

What We Think

- Try applying FEPS
- Definite data disconnect discomfort
- Bounding estimate 10X approach:
    - Understand and commit to iterative approach
    - Clearly document other work to close data gaps.
    - Alt CM’s/cases that fit what data shows (e.g. clasitc dike that increases contaminant movement rate; increased water input resulting in increased contaminant movement rate.)

- Resource/timing/political/regulatory issues.