West Valley Demonstration Project

NRC Request for Information on the WVDP Phase 1 Decommissioning Plan

Proposed DOE Responses

DOE-NRC Meeting

June 15, 2009

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for the U.S. Department of Energy

Objectives

- Objectives

  (1) To provide information on DOE's proposed plans for resolving 33 of the 44 comments

  - To provide an opportunity for NRC to ask questions and offer suggestions
  - To facilitate resolution of the RAI comments and preparation of the associated Revision 2 to the Decommissioning Plan
  - Resolution of the other 11 comments is straightforward and does not need to be discussed

  (2) To summarize plans for Revision 2 to the DP

  - Some changes are being made for reasons other than the RAI comments (including providing for releasing some areas with potential surface soil contamination during Phase 1)

  (3) To reach agreement on meeting follow up actions

Agenda (to discuss 33 comments in order they were provided)*

1. Feedback needed on proposed approach to ensure that it will be satisfactory to NRC

ESC1 (1) underground lines
4C1 (4) soil concentration, DCGLs
4C2 (5) Process Building releases
5C1 (6) preserving options
5C3 (8) flow field & DCGLs
5C4 (9) no erosion basis
5C6 (11) cistern scenario
5C7 (12) subsurf. DCGL approach
5C9 (14) subsurface contamination
5C10 (15) contaminated area
5C11 (16) streambed model
5C13 (18) streambed model
5C15 (20) para. conservatism
5C16 (21) K_d conservatism
5C17 (22) γ shielding factor
5C18 (23) pumping, irriga. rates
5C19 (24) contam. plant fraction
5C20 (25) barriers & parameters
5C21 (26) I-129/conductivity
7C1 (30) excava. Groundwater
7C2 (31) excavated soil
9C1 (32) characteriz. surveys
9C2 (33) field detection limits
9C3 (34) soil background data
9C4 (35) FSSP details
DC1 (36) sheet pilings
DC2 (37) flow change impacts
DC3 (38) barrier performance
DC4 (39) barrier correct. actions
DC6 (41) barrier monitoring
DC7 (42) barrier wall stability
DC8 (43) PRB, PTW interactions
DC9 (44) Flow changes, WMA 3

2. No clarification needed, response expected to be straightforward (not to be discussed)

1C1 (2) Phase 2 studies
3C1 (3) numerical techniques
5C2 (7) screening approach
5C5 (10) well driller analysis
5C8 (13) model gas, oil wells
5C12 (17) inhalation pathway
5C14 (19) transfer factors
6C1 (27) ALARA
6C2 (28) ALARA
6C3 (29) ALARA
CD5 (40) missing text

*Will discuss probabilistic uncertainty analysis in addressing 5C15 (20)

ESC1 (1), underground piping (1 of 1)

NRC path forward: Provide a description of the locations, depths and distributions of the piping as well as the estimated radiological inventory

Proposed DOE approach: Add requested information in a new appendix

Key elements in DOE approach:

- Information to be included in new appendix includes:
  - Approximately 20 pages of information, including a table, figures, and a general description of the underground lines, their location, and their depths
  - Residual radioactivity estimates for key lines and groups of lines
- The Luckett, et al. 2004 inventory report provides the requested information (provided with key references)
  - Figures 7-6 and D-1 show WMA 1 process and interceptor lines, with depths

Does NRC have any comments on this approach?

4C1 (4), average soil concentrations and DCGLs (1 of 5)

NRC path forward: [numbers added for discussion purposes]

(1) Sufficient information should be provided by DOE to determine the distribution (i.e., lateral and vertical extent) of contamination across the site and in saturated sediments to ensure that surface soil DCGLs are appropriately derived and used to demonstrate compliance with License Termination Rule (LTR) criteria.

(2) DOE should clarify how soil concentrations will be estimated and compared to surface soil DCGLs in the final status surveys to ensure that doses are not significantly underestimated.

(3) DOE should also indicate what criteria will be used to determine the applicability of surface soil DCGLs in Phase 1 should the DP be revised as indicated on Page 5-4 to support remediation of surface soil.

4C1 (4), average soil concentrations and DCGLs (2 of 5)

Key elements in DOE approach:

(1) Contamination distribution and DCGLs

- The CSAP being prepared by ANL will provide for determining the distribution of contamination across the project premises, including in Erdman Brook and Franks Creek
  - The CSAP will be provided to NRC for review by December 2009
  - DOE plans to begin the characterization program shortly after any NRC comments on the CSAP are resolved and the CSAP is issued
  - Characterization to include inventory and mapping of buried infrastructure
- Decided not to change the surface soil DCGL model contamination zone thickness based on characterization data
  - DP to be changed accordingly in Rev 2

4C1 (4), average soil concentrations and DCGLs (3 of 5)

Key elements in DOE approach (continued):

(2) Soil concentration averaging and the final status surveys

- Soil sampling for Phase 1 remedial action surveys and final status surveys will be conservative with respect to the refined surface soil model with most samples collected from the top 6-12 inches of soil
  - Samples not to be averaged over 1 meter thickness
  - Section 9 will be changed to cover sampling depths
  - NUREG-1757 statements about surface soil depths vary (top 15 cm, depth of 15-30 cm, no more than 1 m)
- DOE plans to make use of a composite sampling approach for final status surveys

4C1 (4), average soil concentrations and DCGLs (4 of 5)

Key elements in DOE approach (continued):

(2) Soil concentration averaging and the final status surveys (continued)

- Composite sampling
  - Involves taking soil increments systematically from a portion of a survey unit and combining them into a homogenized composite sample before analysis
  - Recognized by EPA in SW-846 and has been used effectively with NYSDEC approval for final status surveys on the Rattlesnake Creek FUSRAP project
  - Offers better efficiency compared to individual sample analysis
    - More likely to detect elevated areas for nuclides not conductive to scans
    - More likely to produce representative average activity across survey unit for same sampling effort
- The Phase 1 FSSP will provide details
  - DOE can provide a separate briefing to NRC on this matter if desired

4C1 (4), average soil concentrations and DCGLs (5 of 5)

Key elements in DOE approach (continued):

(3) Criteria for applying surface soil DCGLs

- Section 5 will be changed to clarify that surface soil DCGLs and the associated cleanup goals will apply only to those areas determined to have no subsurface soil contamination
    - Surface soil DCGLs will not be considered to be applicable to the area impacted by the north plateau groundwater plume
    - Available characterization data are not sufficient to support additional DCGL development
    - Surface soil DCGLs (cleanup goals) will be used in connection with releasing certain areas with potential surface soil contamination during Phase 1
        - Rev 2 to the DP will provide for this

Does NRC have any comments on this approach?

4C2 (5), characterization of Process Bldg releases (1 of 4)

NRC path forward: Provide a description of the areal and vertical extent of sampling for contamination that has been completed associated with the H-piles and other discrete engineered features relative to past major spills, leaks, or known large sources of activity.

Proposed DOE approach: Perform additional characterization specified in CSAP

Key elements in DOE approach:

- Section 4 of the DP summarizes all available characterization data
  - 2008 subsurface soil sampling included in Rev 1
  - Available subsurface soil data in WMA 1 excavation footprint includes data from 21 samples in ULT analyzed for Sr-90 (Table C-4)
  - No data related to foundation pilings or other engineered features (except data from samples taken around a wastewater line leak)

4C2 (5), characterization of Process Bldg releases (2 of 4)

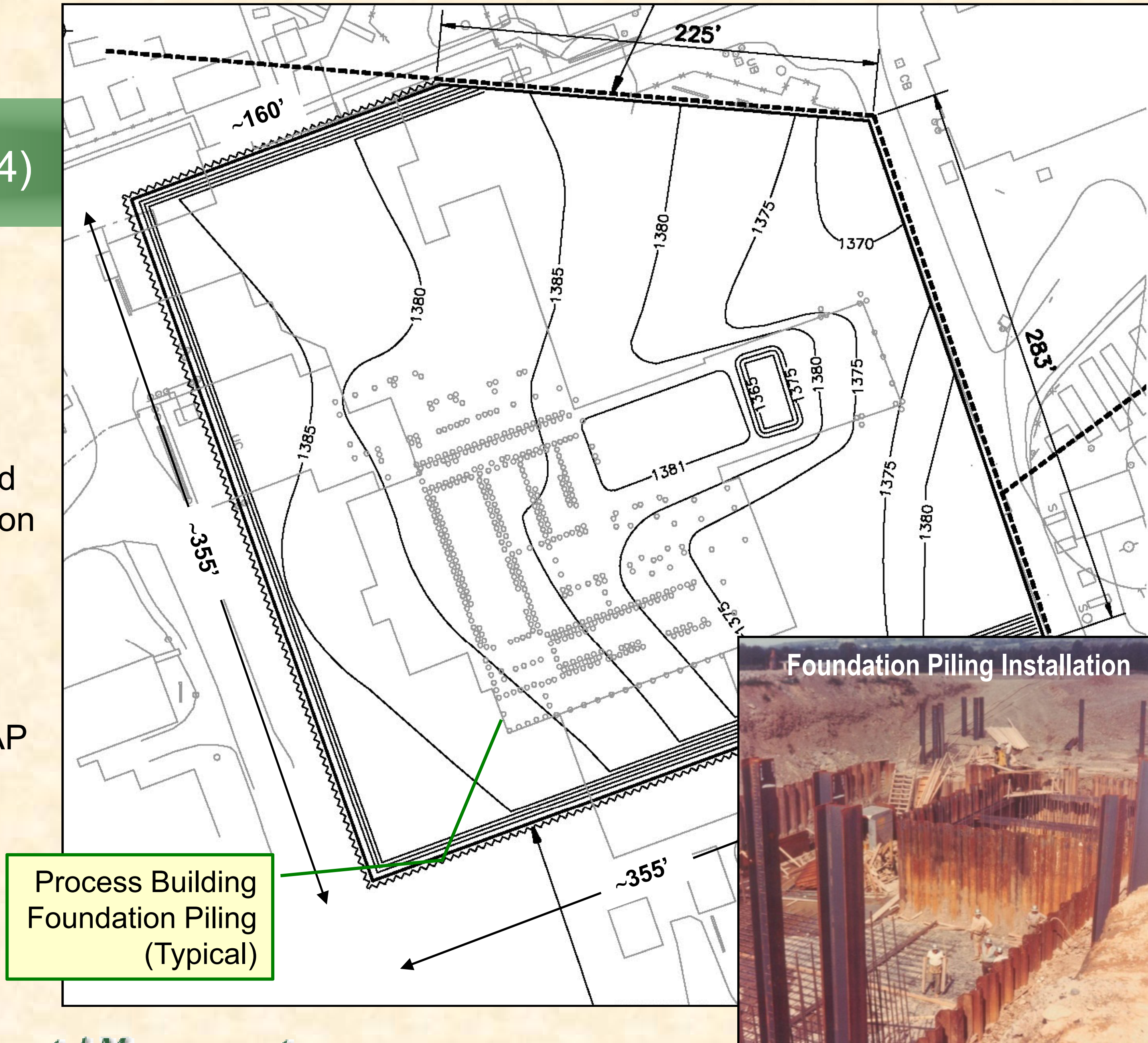
Key elements in DOE approach (continued):

- Future sampling along H piles specified in CSAP will be important to understanding conditions below the excavation bottom
- Sampling of near-surface discrete engineered features (wells, underground tanks and lines) provides waste management information; these features do not provide a potential pathway to deeper groundwater
  - Groundwater wells do not extend into ULT
  - Any contamination related to wastewater tanks and underground lines, which are relatively near the surface, is expected to be in soil to be excavated and disposed of offsite

4C2 (5) (3 of 4)

H Pilings

- 476 pilings
- Systematic surveys planned during excavation when all pilings become accessible
- This will be covered in CSAP



4C2 (5), characterization of Process Bldg releases (4 of 4)

Key elements in DOE approach (continued):

- Input on characterization needs to be informally solicited during preparation of the CSAP from
  - NRC
  - NYSERDA
  - NYSDEC
  - Will need to establish a mechanism for this input
- And the CSAP will be provided to NRC for review

Does NRC have any comments on this approach?

5C1 (6), preserving decommissioning options (1 of 3)

NRC path forward: DOE should provide information to demonstrate its understanding of how contaminants are released from source areas and are transported in the environment to downgradient exposure locations over the 1000 year compliance period. [numbers added for discussion purposes]

(1) Using its current approach, DOE could calculate DCGLs for individual source areas that consider the cumulative impacts of multiple sources at downgradient receptor locations (e.g., attribute a portion of the dose standard at the downgradient receptor location to individual source areas) or demonstrate how DCGLs calculated at the source would bound the DCGLs calculated considering potential impacts at downgradient receptor locations using the aforementioned approach.

(2) DOE could show how the current approach is adequate or bounding by providing quantitative evidence that: (i) Phase 1 source areas do not overlap in space and time with other sources of contamination; or (ii) their dose contributions are expected to be so small relative to the unrestricted dose standard, that it would not be practical to pursue additional clean-up of Phase 1 sources to ensure that unrestricted release is preserved as a decommissioning option at the end of Phase 2.

5C1 (6), preserving decommissioning options (2 of 3)

Proposed DOE approach: Provide additional information in Section 5 to demonstrate that the Phase 1 dose contributions will be so small relative to the unrestricted dose standard that it would not be practical to pursue additional clean-up of Phase 1 sources to ensure that unrestricted release is preserved as a decommissioning option at the end of Phase 2.

Key elements in DOE approach:

- Address potential doses to a receptor located downgradient from the remediated WMA 1 and WMA 2 excavated areas
  - Cumulative doses considering combined Phase 1 sources
- All potential pathways to be addressed
- Plan to provide qualitative discussion, except for STOMP modeling of continuing releases from deep excavations

5C1 (6), preserving decommissioning options (3 of 3)

Key elements in DOE approach (continued):

- STOMP is being used to model releases from the bottom of the WMA 1 and WMA 2 excavations of key radionuclides (Sr-90 and Cs-137)
- Results to be considered in demonstrating that potential doses from the remediated WMA 1 and WMA 2 excavations will be small

Does NRC have any comments on this approach?

5C3 (8), impact of flow field changes on DCGLs (1 of 2)

NRC path forward: As indicated on page 5-41 of the DP, DOE should evaluate the impact of changes to the flow field (e.g., flow directions and productivity) during Phase 1 due to remedial activities.

DOE should demonstrate that well bore dilution is not significantly overestimated with the parameter set selected in RESRAD in the surface and subsurface DCGL calculations in comparison to expected dilution in the real system given the presence of hydraulic barriers and other sources of contamination.

DOE could use the three-dimensional STOMP model constructed for Appendix D analysis, to evaluate the impact of hydraulic barriers and other sources of contamination on the assumed dilution factors.

5C3 (8), impact of flow field changes on DCGLs (2 of 2)

Proposed DOE approach: Address potential impacts of flow fields on DCGLs as requested

Key elements in DOE approach:

- Hydraulic barriers would be unnecessary in site-wide removal alternative
  - Barriers would be removed to restore natural groundwater flow patterns
  - No impact on DCGLs under these circumstances
- Hydraulic barriers would remain in place with close-in-place alternative
  - Restricted release dose limit for inadvertent intruder 4 times higher (100 mrem/yr vs. 25 mrem/yr for unrestricted release, and 25 mrem/yr with institutional controls)
- STOMP model to be used to evaluate barrier impacts on dilution factors
- Impacts of changes in dilution factors in subsurface DCGL model to be evaluated considering higher dose limit for restricted release

Does NRC have any comments on this approach?

5C4 (9), technical basis for no erosion assumption (1 of 2)

NRC path forward: Provide a technical basis that the use of a resident farmer with no depletion of the source area results in more limiting surface DCGLs than those developed for erosion of the source.

The basis should consider the impact of dilution during release and transport that would occur as a result of release from erosion. For example, Figure 2-7 shows the impact of dilution on operational surface water discharges further downstream on Buttermilk Creek.

A full erosion analysis is not necessary, but a relative comparison of concentrations, exposure pathways, uptake rates, and exposure times should be provided.

5C4 (9), technical basis for no erosion assumption (2 of 2)

Proposed DOE approach: Provide basis to demonstrate no erosion assumption is conservative

Key elements in DOE approach:

- Account for contamination redistribution from erosion
  - Considering concentrations diminishing with distance from the source
- Compare pathways, uptake rates, and occupancy factors for resident farmer scenario and recreationist scenario
  - Recreationist scenario more plausible in eroded area with deep gullies
  - Recreationist would spend less time in area than resident farmer and be exposed through fewer pathways
- Evaluation performed in connection with comment 5C6 reinforces conclusions

Does NRC have any comments on this approach?

5C6 (11), show that cistern scenario is bounding (1 of 1)

NRC path forward: DOE should provide the results of a quantitative analysis that supports its assumption that the subsurface DCGLs calculated assuming a cistern driller scenario bound the potential impacts from erosion.

Proposed DOE approach: Provide the requested information

Key elements in DOE approach:

- Provide expanded discussion of long term erosion impacts and resulting conditions in area of Lagoons 1, 2, and 3
  - Limited sheet and rill erosion, deep gullies reaching to bottom of excavation
- Resident farmer scenario not plausible with deep gullies in that area
- Perform analysis of a recreationist/hiker scenario in area of deep gullies
  - Considering direct exposure, ingestion, inhalation, limited time in area
  - Focusing on key risk drivers (Sr-90 and Cs-137)

Does NRC have any comments on this approach?

5C7 (12), DCGL approach may not be not limiting (1 of 2)

NRC path forward: Provide the technical basis that the approach to developing subsurface DCGLs is limiting when groundwater transport and erosion processes are considered.

Part of the technical basis could be assurance that the subsurface DCGLs will exclusively be used to guide remediation of excavated areas in WMA 1 and 2, adequate characterization will be conducted to ensure any unremediated areas are not impacted, and that erosion is not expected to uncover residual WMA 1 and 2 contamination following remediation over the 1000 year compliance period.

If erosion could lead to applicability of an excavation scenario within the 1000 year compliance period (i.e., if erosion could lead to depletion of the cover materials to a thickness of 3 m or less), then an excavation scenario should also be evaluated. Erosion processes may be limited to those that result in landform evolution consistent with the expected future land use scenario.

5C7 (12), DCGL approach may not be not limiting (2 of 2)

Proposed DOE approach: Provide technical basis as requested

Key elements in DOE approach:

- Make it very clear that subsurface soil DCGLs and cleanup goals apply only to the bottom and lower sides of the WMA 1 and WMA 2 large excavations
- Address potential for groundwater contamination by upgradient buried sources, e.g., from old sewage drainage
  - Consider upgradient groundwater monitoring results
- Address other scenarios that might be plausible if erosion were to uncover WMA 2 excavation bottom
  - Home construction (basement excavation) not plausible in area with deep gullies
  - Recreationist scenario in area of deep gullies to be analyzed, as noted previously

Does NRC have any comments on this approach?

5C9 (14), consideration of subsurface contamination (1 of 5)

- **NRC path forward:** [numbers (1) – (3) added for reference purposes]

(1) DOE could provide additional information such as borehole logs for those locations where the top of the Lavery Till was significantly lowered and the Lavery Till Sand eliminated underneath the process building in the vicinity of the source of the North Plateau groundwater plume.

Additional cross-sections overlaying recent concentration data over reinterpreted geology underneath the process building would also provide additional confidence in the revised hydrogeological conceptual model.

5C9 (14), consideration of subsurface contamination (2 of 5)

- **NRC path forward**: [numbers added for reference purposes]

(2) DOE should provide additional details on how in-process or final status survey data will be collected at the bottom of excavations. A procedure should be in place to provide adequate assurance that the thickness of contamination at depth is less than assumed in the DCGL calculations and is present within the impermeable Lavery Till as assumed in the DCGL calculations.

If the thickness of contamination is significantly greater than assumed and/or is present in more permeable sediments (e.g., Lavery Till Sand), then sufficient data should be collected to perform additional dose modeling to adequately assess risk.

If DOE amends the DP to allow use of surrogate DCGLs to demonstrate compliance with LTR criteria at the bottom of the WMA 1 and 2 excavations, DOE should provide supporting information such as radioisotopic ratios within the Lavery Till used to derive the surrogate DCGLs. DOE should also indicate how it intends to update surrogate DCGLs based on collection of additional data obtained during in-process or final status surveys, if necessary.

5C9 (14), consideration of subsurface contamination (3 of 5)

- **NRC path forward:** [numbers added for reference purposes]

(3) As discussed in a preceding comment, it is recommended that DOE provide results of calculations or perform additional modeling (e.g., multi-dimensional groundwater modeling using STOMP) to show the impacts of (i) a pumping well, and (ii) hydraulic barriers on the flow field in the immediate vicinity of WMA 1 and 2 excavations and potential transport of contaminants from the Lavery Till to a the drinking water well located in the sand and gravel.

DOE should also evaluate the potential risk associated with transport of contamination from the Lavery Till to the KRS or to surface water. This information could be used to provide additional support that the potential contributions from subsurface contamination to the overall risk from the site from other pathways of exposure (i.e., drilling scenario) are insignificant.

5C9 (14), consideration of subsurface contamination (4 of 5)

Proposed DOE approach:

- The approach to address (1) will involve providing supporting information for the current interpretation of the location of the Lavery till sand and the location of the upper surface of the ULT in the Process Building area
- The issues discussed in (2) will be addressed as requested
- The issues in (3) will be also be addressed for Sr-90 and Cs-137

Key elements in DOE approach:

- Use of WMA 1 borehole data to better describe the current interpretation of the geologic layers in WMA 1
- The DP will provide requirements for sample depth at the bottom of the deep excavations and collection of sufficient data to support the final dose assessments

5C9 (14), consideration of subsurface contamination (5 of 5)

Key elements in DOE approach:

- The requirements in the DP on use of surrogate radionuclides will also be expanded
  - Available data suggest that it will not be practicable to use a surrogate gamma-emitting radionuclide at the bottom of the deep excavations
- The STOMP modeling discussed previously will evaluate Sr-90 and Cs-137 release from residual contamination at the bottom of the deep excavations
- The probabilistic uncertainty analysis will evaluate a range of well pumping rates in the subsurface soil DCGL model

Does NRC have any comments on this approach?

5C10 (15), subsurface model contaminated area (1 of 2)

NRC path forward: Suggest calculating DCGLs considering a 100 m^2 and larger areas (e.g., 1000 m^2) of contamination and use the more limiting DCGL for the list of 18 radionuclides evaluated or provide additional justification for why an assumed 100 m^2 area of contamination is reasonable.

Proposed DOE approach: Address this matter in the probabilistic uncertainty analysis (to be explained in slides 34 to 44)

Key elements in DOE approach:

- Probabilistic model varies contaminated area from 30 to 300 m^2
  - Triangular distribution with mean of 100 m^2 (the deterministic value)
- Contaminated layer thickness varied from 0.1 to 1.0 m
  - Triangular distribution with mean of 0.3 m (the deterministic value)

5C10 (15), subsurface model contaminated area (2 of 2)

Key elements in DOE approach (continued):

- DOE will evaluate the probabilistic uncertainty analysis results and determine the appropriate actions
  - As discussed later
- Regarding the 100 m^2 area assumed in the deterministic model, given the small volume of excavated material a 1000 m^2 area would be only about 1 inch thick

Does NRC have any comments on this approach?

5C11 (16), streambed DCGL models (1 of 2)

- **NRC path forward:** For the purposes of Phase 1 DCGL calculations, DOE should evaluate the adequacy of the adaptation of the conceptual model in RESRAD for calculation of stream bed DCGLs.

  DOE should clarify that the streambed DCGLs only consider *existing* contamination and that future release and transport to streambeds from upgradient sources is considered separately in a combined dose assessment, if DOE performs such a combined dose assessment to address NRC comments (see comment 5C1 above).

  To guide final decisions on decontamination and decommissioning of the site, DOE should consider interactions between contaminated groundwater and surface water in estimating future risks including seepage/discharge concentrations from upgradient sources, and potential accumulation of residual contamination on stream beds from erosion, flooding, seasonal water fluctuations, and other processes.

5C11 (16), streambed DCGL models (2 of 2)

Proposed DOE approach: Provide additional discussion to support the model and clarify the limitations on the DCGLs and cleanup goals

Key elements in DOE approach:

- Additional discussion to describe how RESRAD model was adapted to calculate the streambed DCGLs
  - Addressing how radioactivity enters and moves though the streams, plausible future land uses, potential receptors, and potential future impacts on the streams
- Streambed DCGLs designed to support the site-wide removal alternative
  - Not necessarily the close-in-place alternative where future processes can impact the streams
  - This will be made clear in DP

Does NRC have any comments on this approach?

5C13 (18), streambed sediment contamination (1 of 1)

NRC path forward: Provide a comparison of the assumed size of the contaminated zone to the observed contamination of streambed sediment.

Proposed DOE approach: No changes, since this matter is addressed in the DP

Key elements in DOE approach:

- Available data as summarized in Section 4 are insufficient for this purpose
  - Characterization will produce more data on stream bank and streambed contamination
  - These data will be used in the requested comparison

Does NRC have any comments on this approach?

5C15 (20), conservatism in model input parameters (1 of 11)

NRC path forward: DOE should provide support that the selection of parameter values in the deterministic analysis does not significantly under-predict the potential risk associated with residual material remaining at the site following remediation.

Using what limited characterization data is available, DOE should identify the key risk drivers and indicate how the parameter selection is conservative for these radionuclides.

In the absence of sufficient information on radionuclide distributions, DOE should consider use of pathway- or radionuclide-dependent parameter sets that would tend to over-estimate rather than under-estimate the potential dose when considering the potential uncertainty associated with the dose calculations.

5C15 (20), conservatism in model input parameters (2 of 11)

Proposed DOE approach: Perform a probabilistic uncertainty analysis and take appropriate actions on the results (possibly changing input parameters in the deterministic models or using the peak-of-the-mean probabilistic DCGLs), revising Section 5 and adding new Appendix E with details, providing details of Section 5 changes and new Appendix E with RAI response

Key elements in DOE approach:

- Effort initiated in January 2009 to resolve the open item identified in the DOE letter forwarding Rev 0 to the DP for evaluating the degree of conservatism in conceptual model key input parameters
- Other considerations in this approach
  - DOE's recent use of probabilistic dose modeling at other sites
  - The advantages of probabilistic dose modeling, such as those described in Appendix I to NUREG-1757, vol. 2
  - CTF recommendations about probabilistic dose modeling

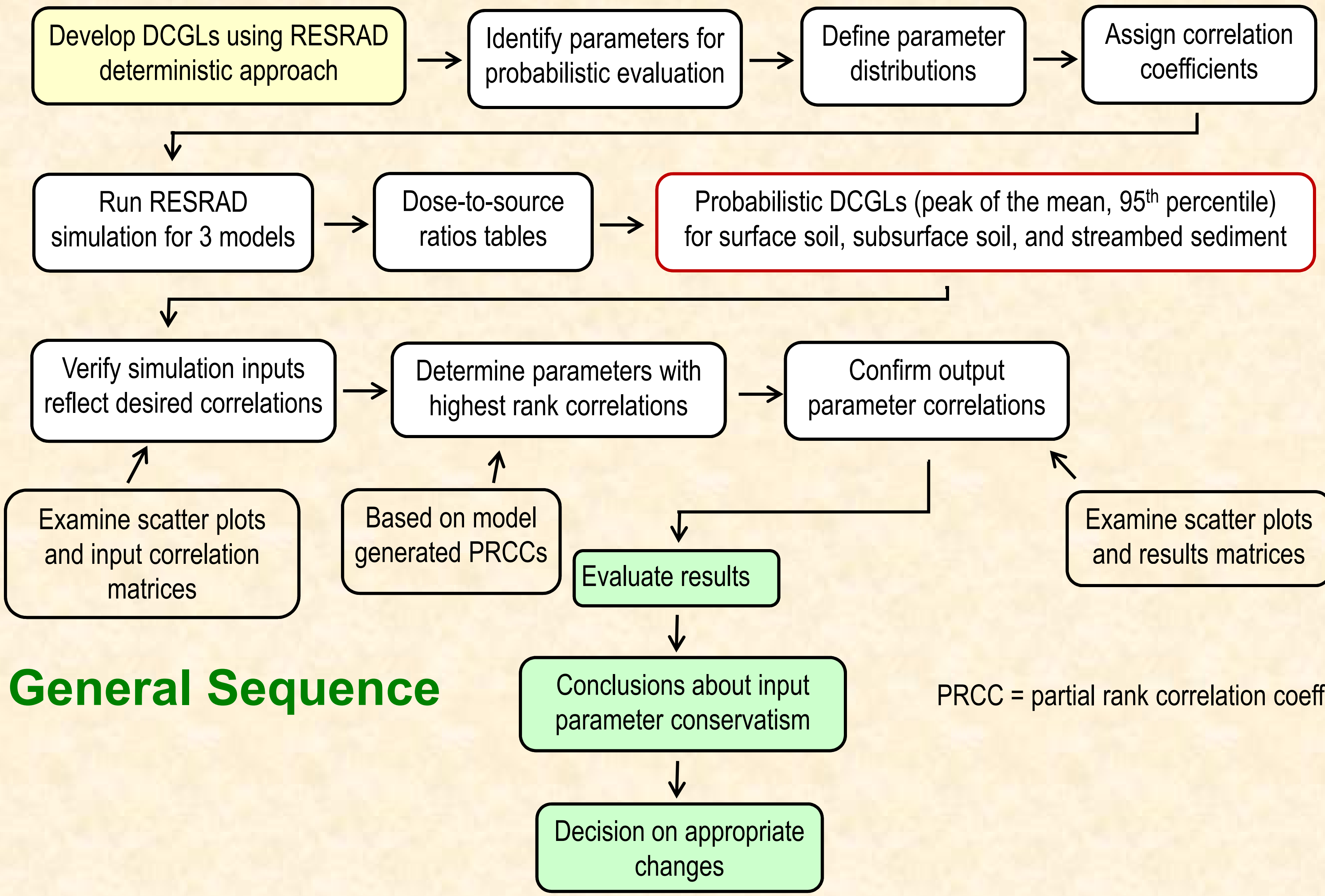
The following slides outline the approach being taken

5C15 (20), conservatism in model input parameters (3 of 11)

General Approach

- Make use of probabilistic capabilities of RESRAD version 6.4
- Evaluate key input parameters for 3 conceptual models
  - Surface soil, subsurface soil, streambed sediment
- Calculate peak-of-the-mean $DCGL_w$ values for 25 mrem/y for each of 18 radionuclides of interest
- Calculate 95th percentile $DCGL_w$ values for 25 mrem/y
- Evaluate results, draw conclusions, decide on actions
- Describe details in new Appendix E and associated Attachment 1 electronic files

WVDP Phase 1 Decommissioning Plan – Proposed Approaches to RAI Comment Responses



General Sequence

PRCC = partial rank correlation coefficient

5C15 (20), conservatism in model input parameters (5 of 11)

Key parameter selection

- Consider deterministic sensitivity analysis results and primary dose drivers for each model (Section 5.2.4)
  - Sr-90, I-129, Cs-137, U nuclides for soil
  - Sr-90 and Cs-137 for streambed sediment
- Also consider
  - Availability of site-specific information
  - NRC guidance on potentially significant parameters
  - Preliminary model simulations
- Select for evaluation
  - 19 soil model, 19 subsurface soil, and 12 sediment parameters
  - Eliminated soil porosity and density from further consideration based on preliminary simulations indicating low correlation with dose.

5C15 (20), conservatism in model input parameters (6 of 11)

Parameter distribution selection

- Based on applicable guidance in NUREG/CR-6676 and NUREG/CR-6697
- One of the following distributions, as applicable
  - Triangular (for soil physical parameters and behavioral parameters)
  - Bounded normal (for precipitation)
  - Lognormal (for plant, milk, meat, fish biotransfer factors)
  - Bounded lognormal (for K_ds where data spread excessive)
    - Bounds based on available literature values and consideration of site-specific data

5C15 (20), conservatism in model input parameters (7 of 11)

Assign correlation coefficients

- Follow examples in NUREG/CR-6676
  - 0.95 for directly correlated parameters
  - -0.95 for inversely correlated parameters
- Use -0.87 for correlation of K_d with plant, meat, and milk transfer factors based on 1984 Oak Ridge study (Baes, et al.)
- Provide details in Appendix E tables

5C15 (20), conservatism in model input parameters (8 of 11)

Run RESRAD simulations, evaluate results

- Produce dose-to-source ratios for each model
- Calculate DCGLs for 25 mrem/y for each model
- Examine scatter plots and input matrices to ensure inputs reflect desired correlations
- Determine parameters with the highest rank correlations by evaluating PRCCs
- Examine scatter plots to confirm output parameter correlations
- Compare probabilistic DCGLs to deterministic DCGLs

5C15 (20), conservatism in model input parameters (9 of 11)

Evaluate results, develop conclusions

- Determine whether deterministic DCGLs are bounding
  - That is, whether peak-of-the-mean DCGLs exceed deterministic DCGLs indicating sufficient conservatism in input parameters for each of the 3 models
  - Also, whether 95th percentile DCGLs (a more conservative reference point) exceed deterministic DCGLs in any cases
- Identify which input parameters are insufficiently conservative and which account for the most uncertainty

5C15 (20), conservatism in model input parameters (10 of 11)

Determine actions on results

- Could involve
  - No changes to the deterministic DCGLs (results used just to inform)
  - Changes to selected input parameters and recalculating the deterministic DCGLs
  - Use of the probabilistic peak-of-the-mean DCGLs
- DOE will make the decision on actions to be taken on the results after completion of peer reviews of the modeling
- Rev 2 to incorporate the changes made and new Appendix E

5C15 (20), conservatism in model input parameters (11 of 11)

In summary, planned process involves

- Using RESRAD version 6.4 probabilistic capabilities
- Establishing key parameter distributions following NRC guidance
- Calculating peak-of-the-mean and 95th percentile DCGLs
- Evaluating results, comparing to deterministic DCGLs
- Developing conclusions and deciding on action
- Incorporating Appendix E and related changes in Rev 2 to the DP

Does NRC consider this approach to be reasonable?

DOE can provide a follow-up briefing after completion of the peer reviews to discuss the results and how they will be used

5C16 (21), conservatism in K_d selection (1 of 2)

NRC path forward: As K_ds for risk-significant radionuclides can have a large impact on dose, K_ds values should be selected that are expected to err on the side of over-predicting rather than under-predicting the potential dose in the deterministic analysis when site-specific information is not available, or is uncertain.

Commensurate with the risk significance of the parameter values, DOE should provide a more comprehensive discussion on how the K_ds were conservatively selected from the expected uncertainty range and address the issues listed above.

DCGL calculations are also expected to be complicated by the in-growth of progeny in decay chains. Impacts due to the selection of K_ds for daughter products were not studied but may also have a large impact on the DCGL calculations. Therefore, the uncertainty introduced by the selection of K_ds for daughter products should also be evaluated in the sensitivity analysis and managed with conservative assumptions.

5C16 (21), conservatism in K_d selection (2 of 2)

Proposed DOE approach: Perform the probabilistic uncertainty analysis, evaluate the results, and make any appropriate changes

Key elements in DOE approach:

- The probabilistic uncertainty analysis involves using ranges of K_d values based on site-specific and literature values, with bounded lognormal distributions
- For progeny, ranges of K_d values were used based on site-specific and literature values with bounded lognormal distributions

Does NRC have any comments on this approach?

5C17 (22), conservatism in external γ shielding factor (1 of 1)

NRC path forward: DOE should demonstrate that its selection of parameters does not significantly underestimate the potential risk from residual radioactivity remaining at the site. When appropriate, DOE should consider using radionuclide-specific parameter sets that consider the most important parameter values for individual radionuclides (e.g., external shielding factor for Cs-137) and select parameter values that are expected to over — rather than under — estimate the potential dose.

Proposed DOE approach: Include this parameter in the probabilistic uncertainty analysis and consider inclusion of additional radionuclide-specific parameters

Key elements in DOE approach:

- Perform probabilistic uncertainty analysis, evaluate the results, and make any appropriate changes

Does NRC have any comments on this approach?

5C18 (23), conservatism in pumping, irrigation rates (1 of 3)

NRC path forward: DOE should demonstrate that its selection of parameters does not significantly underestimate the potential risk from residual radioactivity remaining at the site considering the potential uncertainty in the dose predictions.

In the absence of sufficient characterization data to demonstrate that the DCGLs calculated err on the side of conservatism considering the actual mix of radionuclides expected to remain at the site following remediation, DOE should consider using a radionuclide-specific parameter set that considers the most important parameter values for individual radionuclides (e.g., pumping and irrigation rates for 1-129) and select parameter values that tend to overestimate— rather than under — estimate the potential dose.

DOE should [1] justify its selection of pumping and irrigation rates for the surface and subsurface soil DCGL calculations and [2] evaluate whether a resident scenario would be more limiting then a resident farmer scenario. DOE should justify its selection of parameter values to achieve the targeted infiltration rate of 0.42 m/yr and provide support that this infiltration rate does not lead to a significant under-estimate of risk for key radionuclides.

5C18 (23), conservatism in pumping, irrigation rates (2 of 3)

Proposed DOE approach: Revaluate pumping and irrigation rates used and change as indicated. Include in the probabilistic uncertainty analysis and consider inclusion of additional radionuclide-specific parameters. Model the residential scenario as well as the resident farmer scenario

Key elements in DOE approach:

- Evaluate basis for pumping and irrigation rates to ensure realistic
  - Consider EPA guidance, provide discussion to support basis
- Perform probabilistic uncertainty analysis, evaluate the results, and make any appropriate changes
  - Using realistic values as means
- Model the residential scenario for subsurface soil DCGLs
  - And for surface soil DCGLs also, if indicated by the results

5C18 (23), conservatism in pumping, irrigation rates (3 of 3)

Key elements in DOE approach (continued):

- If results show residential scenario to be less conservative than the resident farmer model, retain the resident farmer scenario in the base model
  - If results were to show otherwise, then the base model would be changed to the resident scenario, as applicable

Does NRC have any comments on this approach?

5C19 (24), contaminated plant fraction (1 of 1)

NRC path forward: DOE should use a contaminated plant fraction of 1 and adjust the plant ingestion rates, if necessary, to reflect the expected yield from a smaller area of contamination to ensure that the plant ingestion rates are not arbitrarily reduced by one-half or provide support for the reduced plant ingestion rates. DOE is encouraged to use regional-specific plant ingestion rates, which may be significantly lower then the default values in RESRAD.

Proposed DOE approach: A plant fraction of 1 will be used for surface soil DCGLs in conjunction with site-specific intake rates. A plant fraction of -1 will be used for subsurface soil DCGLs to allow probabilistic evaluation of contaminated zone areas ranging from 30 to 300 m^2

Key elements in DOE approach:

- Identification of applicable site-specific vegetable, grain, and fruit uptake rates

Does NRC have any comments on this approach?

5C20 (25), consider barriers in hydraulic parameters (1 of 1)

NRC path forward: DOE should consider the impact of hydraulic barriers on the flow field when selecting parameter values for use in RESRAD or show how its selection of parameter values is reasonable or conservative. [based on anticipated decreased groundwater flow due to lower hydraulic gradient, which is 0.03 in model vs. RESRAD default of 0.02]

Proposed DOE approach: Provide additional discussion to address this matter

Key elements in DOE approach:

- In site-wide release alternative, hydraulic barriers not required, would be removed to restore natural groundwater flow
- In site-wide close-in-place alternative, impact from decreased groundwater flow would not be a significant factor due to restricted release conditions with large Phase 2 sources remaining

Does NRC have any comments on this approach?

5C21 (26), I-129 sensitivity to hydraulic conductivity (1 of 3)

NRC path forward: Provide additional technical basis that the observed change in I-129 DCGL is a result of travel time to the well, or clarify the underlying reason for the change. [decreased hydraulic conductivity led to counterintuitive DCGL increase]

Proposed DOE approach:

- Add technical basis in Section 5.2.4, to indicate that the RESRAD non-dispersion model calculation of dilution factors is a primary basis for the parameter uncertainty
  - The model utilizes four different equations for the calculation of dilution factors, based on parameters such as well depth, contaminated area, area parallel to aquifer flow, infiltration rate, etc., which may lead to counterintuitive results for deterministic evaluations

5C21 (26), I-129 sensitivity to hydraulic conductivity (2 of 3)

Proposed DOE approach (continued):

- In the specific case of I-129, the dilution factor is reduced from 0.2 to 0.026 when reducing the hydraulic conductivity from 140 m/yr to 1 m/yr
  - For the high conductivity case, the dilution factor is calculated based on the depth of contamination in the aquifer relative to the depth of well intake
  - For the low conductivity case, the dilution factor is calculated as a ratio of infiltrating recharge to aquifer pumping rate
- The probabilistic evaluation is based on a distribution of input values for hydraulic conductivity, as well as additional parameters (described above), utilized in the calculation of dilution factors

5C21 (26), I-129 sensitivity to hydraulic conductivity (3 of 3)

Key elements in DOE approach:

- The resulting output distribution of calculated doses provides values representing the extreme cases resulting from certain parameter combinations
  - Also gives perspective on the likelihood of such an occurrence.
  - The probabilistic results will eliminate reliance on deterministic extremes as a measure of uncertainty in calculated doses

Does NRC have any comments on this approach?

7C1 (30), excavation groundwater management (1 of 3)

NRC path forward: Based on the site-specific aquifer hydraulic data, planned excavation, and hydraulic barrier design details; provide an estimate or design of the proposed dewatering system, such as number of wells, and pumping capacity as well as an explanation on how the planned hydraulic barriers will prevent infiltration of upgradient groundwater into the WMA 2 excavation or how excess water will be managed.

Proposed DOE approach: Change conceptual schedule to show WMA 1 remediation starting before WMA 2 remediation to take advantage of the LLWTF in treatment of groundwater in the WMA 1 excavation. Add to the DP a requirement to provide the final excavation detailed design (including groundwater management details) to NRC for information

7C1 (30), excavation groundwater management (2 of 3)

Key elements in DOE approach:

- Installing WMA 1 hydraulic barrier wall before excavating WMA 2 will ensure that it is in place to retard infiltration of upgradient groundwater into the WMA 2 excavation
- Groundwater in the two deep excavations can be managed using standard excavation dewatering methods, such as dewatering wells and sump pumps
- Historical photos of the Process Building area during construction indicate effective groundwater management with sheet pilings and submersible pumps
- Development of dewatering design details at this point would be premature
  - The excavation design cannot be finalized until additional characterization data are collected as provided for in the CSAP

7C1 (30), excavation groundwater management (3 of 3)

Key elements in DOE approach (continued):

- There are disadvantages to being unnecessarily prescriptive in the DP on methods of work performance
  - Would limit ability of the decommissioning contractor to use more efficient methods
  - Extra costs and delays associated with contract change orders would be expected based on experience
- Providing the final design details to NRC after they are developed will afford NRC staff an opportunity to make comments before the excavation work begins

Does NRC have any comments on this approach?

7C2 (31), plan for excavated soil management (1 of 3)

NRC path forward: Provide a detailed plan on the management of excavated soils including the location of interim storage areas and environmental controls, and the radiological and associated quality programs for measuring the radioactivity in the soils for segregating non-contaminated soil and contaminated soil. If soil with residual radioactivity is to be returned to the excavation, assess the impact on the dose modeling and the final status survey design.

Proposed DOE approach: (1) Revise Section 1 to provide for development of a Waste Management Plan, to be provided to NRC for information. (2) Revise Section 7 to make it clear that all excavated soil will be shipped offsite for disposal and that only uncontaminated soil brought in from offsite will be used to backfill the excavations. (3) Revise Section 9 to require final status surveys of excavated soil laydown areas. (4) Do not add additional details on excavated soil management to the DP.

7C2 (31), plan for excavated soil management (2 of 3)

Key elements in DOE approach:

- It has been agreed that DOE will manage radioactive waste, health and safety, and environmental monitoring and control in accordance with DOE procedures (pp. 1-11 thru 1-14, A-20, A-24, and A-25)
- A Waste Management Plan will be beneficial and this plan will cover basic requirements related to excavated soil management
- Shipping all excavated soil for offsite disposal eliminates potential issues with reuse of such soil
- Providing for final status surveys in soil laydown areas will eliminate issues with uncontaminated areas becoming contaminated during Phase 1 decommissioning activities

7C2 (31), plan for excavated soil management (3 of 3)

Key elements in DOE approach:

- It is considered better to leave soil laydown area location to the decommissioning contractor
  - There are disadvantages to being unnecessarily prescriptive in the DP on methods of work performance

Does NRC have any comments on this approach?

9C1 (32), characterization surveys (1 of 4)

- **NRC path forward:** [numbers added for reference purposes]

(1) Considering the emphasis that has been placed on the Characterization Sample Analysis Plan and its usage as a basis for in-process and final status surveys, it is requested that this plan be submitted to the NRC in order to supplement the technical review of the WVDP Phase 1 Decommissioning Plan.

(2) NUREG-1757, Vol. 2, Sections 2.3 and 4.2 (NRC, 2006) states that there is no requirement that the final status survey be performed at the end of the decommissioning process, but in order to use other surveys the data must be of sufficient quality and detail to meet the expectations for final status survey data. It is also important to ensure that non-impacted areas of the site have not been adversely affected by decommissioning activities.

(3) On next slide

9C1 (32), characterization surveys (2 of 4)

- **NRC path forward:** [numbers added for reference purposes]

(3) Characterization DQOs are briefly outlined in the DP Section 9.4, but not applied, and it is noted that they will be detailed later in the Characterization Sample and Analysis Plan.

   (a) Further elaborate on how the quality control of measurements and samples will be maintained during characterization surveys.

   (b) Describe the plans to ensure non-impacted and excavated areas will not be adversely affected during the decommissioning process.

   (c) Provide the details of site characterization DQOs that will be consistent with those for final status surveys. NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)." (NRC, 2000) and NUREG-1757, Vol. 2, Sections 4.2 and 4.4, and Appendix D and E (NRC, 2006) may provide additional guidance on the planning required for characterization and final status surveys.

9C1 (32), characterization surveys (3 of 4)

Proposed DOE approach: Submit CSAP to NRC for review and provide other requested information

Key elements in DOE approach (1):

- The CSAP will be submitted for review by December 2009
- The CSAP will collect data across the project premises to support planning for Phase 2 and potential release of some impacted surface soil areas during Phase 1 (Rev 2 change)

Key elements in DOE approach (2):

- Section 9 will be changed in Rev 2 to require final status surveys in excavated soil laydown areas and the FSSP will provide details
  - Do not plan to provide details in the DP

9C1 (32), characterization surveys (4 of 4)

Key elements in DOE approach (3):

- Section 9.4 will be changed to clarify that quality control of measurements and samples in the Characterization Plan will be maintained to comply with the Project QA Program described in Section 8
- Section 7.2.2 identifies mitigative measures for soil laydown areas
  - This section will be revised to address mitigative measures for excavated areas, such as the remediated WMA 1 area while WMA 2 remediation is in progress
  - Additional details will also be included to provide mitigative measures for other non-impacted areas of the project premises
- More information on DQOs for characterization and the characterization goals will be incorporated into Section 9
  - DQOs for remedial action support surveys will also be addressed

Does NRC have any comments on this approach?

9C2 (33), field survey detection limits (1 of 4)

- **NRC path forward:** [numbers added for reference purposes]

(1) Provide a demonstration that methodologies proposed are capable of detecting residual radioactivity sufficiently below the proposed DCGLs in the WVDP DP. This demonstration should be performed for each of the ten (10) major survey areas based on characterization data currently available with the goal of demonstrating the ability to accurately measure DCGLs under site-specific measurement conditions. The focus of the demonstration should be on determining the appropriate field instrumentation and detectors and survey methods. The demonstration and justification for the survey methods chosen should be based on the minimum detectable count and scanning rates, the use of surrogate nuclides for hard-to--detect nuclides, and how backgrounds will be determined and applied in the field.

9C2 (33), field survey detection limits (2 of 4)

- **NRC path forward:** [numbers added for reference purposes]

(2) If laboratory soil analysis is required, report Lower Limits of Detection in the same units as the DCGLs. Provide the procedure, discussion, and justification for the survey methodology for determining how it will be demonstrated that sufficient soil has been removed and that there is no residual radioactivity at depth. NUREG-1757, Vol. 2, Section 4.3 and Appendix E (NRC, 2006) provide additional guidance on remediation action support surveys and in-process surveys.

9C2 (33), field survey detection limits (3 of 4)

Proposed DOE approach: Provide detection capability demonstration for Cs-137, revise DP after completion of characterization as necessary to refine this information, and provide laboratory minimum detectible concentrations for soil samples in pCi/g (Do not plan to demonstrate detection capabilities for 10 areas, of for other nuclides – sample analytical data will be used instead)

Key elements in DOE approach:

- Remedial action surveys related to DCGLs will be performed in the large excavations
- Remedial action surveys also in shallow excavations to remove infrastructure where these areas are to be remediated (Rev 2 change)
- Remedial action surveys also possible for surface soil (Rev 2 change)
  - In-process surveys and remedial action surveys in facilities such as the Process Building are performed to determine radiological status (not related to DCGLs)
  - Consideration of 10 surveys areas (WMAs) not relevant

9C2 (33), field survey detection limits (4 of 5)

Key elements in DOE approach (continued):

- Available ULT analytical data in WMA 1 suggest that Sr-90 will dominate contamination at the bottom of the deep excavations

Nuclide	Max pCi/g	Nuclide	Max pCi/g	Nuclide	Max pCi/g
Am-241	<0.13	Np-237	<0.021	Tc-99	<0.55
C-14	0.11	Pu-238	<0.023	U-232	0.041
Cm-243	<0.023*	Pu-239	<0.064**	U-233	2.3***
Cm-244	<0.023*	Pu-240	<0.064**	U-234	2.3***
Cs-137	3.9	Pu-241	<0.57	U-235	<0.14
I-129	<0.29	Sr-90	59	U-238	1.4

*Cm-243/244 results, **Pu-239/240 results, ***U-233/234 results

Data from Table 5-1, Table C-4 of DP, with amended sample 76-08 results

21 samples for Sr-90. 12 for Cs-137, including some 7 partly in S&G (11 showed ~MDC)

9C2 (33), field survey detection limits (5 of 5)

Key elements in DOE approach (continued):

- Section 9 will be revised to provide required MDCs for lab analyses in pCi/g and to provide details for remedial action surveys
- ANL now working on crosswalk for 18 nuclides and scanning technologies
- Plan to demonstrate scanning detection capability for Cs-137
  - Plan to refine this information after characterization
  - Not useful to demonstrate for other nuclides because
    - They are expected to be far below DCGLs in areas of interest
    - Cs-137 expected to dominate activity so other gamma-emitting nuclides could not be identified by scanning measurements
- Sample analytical data will be primary remedial action survey method
  - DP will be revised to provide for onsite analytical capability (e.g., gamma spectroscopy and liquid scintillation counting) for efficiency

Does NRC have any comments on this approach?

9C3 (34), use of soil background data (1 of 2)

- **NRC path forward:** Provide a technical justification for the application of the background radiation in the decommissioning survey process. The justification must address application to defining non-impacted and impacted areas and how background activity is used in survey measurements. NUREG-1757, Vol. 2, Appendix A (NRC, 2006), and NUREG-1575 (NRC, 2000) Sections 8.3 and 8.4 provide guidance on determining background, application in radiological surveys, and the statistical tests.

Proposed DOE approach: Provide additional discussion in Section 9 to address this matter

Key elements in DOE approach:

- Data from the WVDP radiation protection and environmental monitoring programs used to identify impacted facilities and areas
  - Sections 4.1.2 and 4.1.3 address impacted and non-impacted facilities, respectively, Section 4.2 identifies impacted soil areas

9C3 (34), use of soil background data (2 of 2)

Key elements in DOE approach (continued):

- The CSAP will provide for additional background measurements to supplement available data summarized in Section 4
  - It will address how background is considered in data evaluation
  - The CSAP will be provided to NRC for review, as noted previously
- The detail in Section 9.5 on in-process surveys will be substantially increased
  - DQOs for in-process and remedial action surveys will be included to ensure data are of sufficient quality for Phase 1 final status survey purposes
  - How background will be subtracted from various measurements will be addressed
- Expect to use the Sign test where background not required to show $DCGL_W$ compliance in the final status survey (based on current DCGLs)
  - Would revisit use of Sign test and need for a background reference area if final DCGLs (cleanup goals) turn out to be much lower

Does NRC have any comments on this approach?

9C4 (35), final status survey plan details (1 of 4)

- **NRC path forward:** Given the characterization data collected to date and the development of the Characterization Plan, In-process/Remediation Action Support Survey information demonstration, and determination of how background concentrations will be applied, provide the details for the Final Status Survey Design for Phase 1 areas. NUREG-1757, Vol.2, Section 4.4 and Appendix E (NRC, 2006) and NUREG-1575 (NRC, 2000) provide additional guidance for Final Status Survey Design.

Proposed DOE approach: Describe the conceptual framework for the FSSP design in detail in the comment response, and later provide the FSSP to NRC for information as has been planned. (The conceptual framework could be included as a new appendix in the DP, if that is considered to be necessary.)

9C4 (35), final status survey plan details (2 of 4)

Key points on final status surveys:

- Called Phase 1 final status surveys
  - Post-remediation surveys that define status at the end of Phase 1 in a rigorous fashion. i.e., collect data sufficient to satisfy MARSSIM FSS guidance
- Phase 1 final status survey objectives
  - Confirm bottom and sides of large excavations meet cleanup goals
  - Confirm that those areas that may have been impacted by Phase 1 decommissioning activities (e.g. excavated soil laydown areas) meet surface soil cleanup goals (assuming they did previously) (Rev 2 change)
  - Confirm that surface soil in selected areas meets cleanup goals (Rev 2 change)
- CSAP will provide for determining radiological status of soil in footprints of removed infrastructure and of empty HLW transfer trench

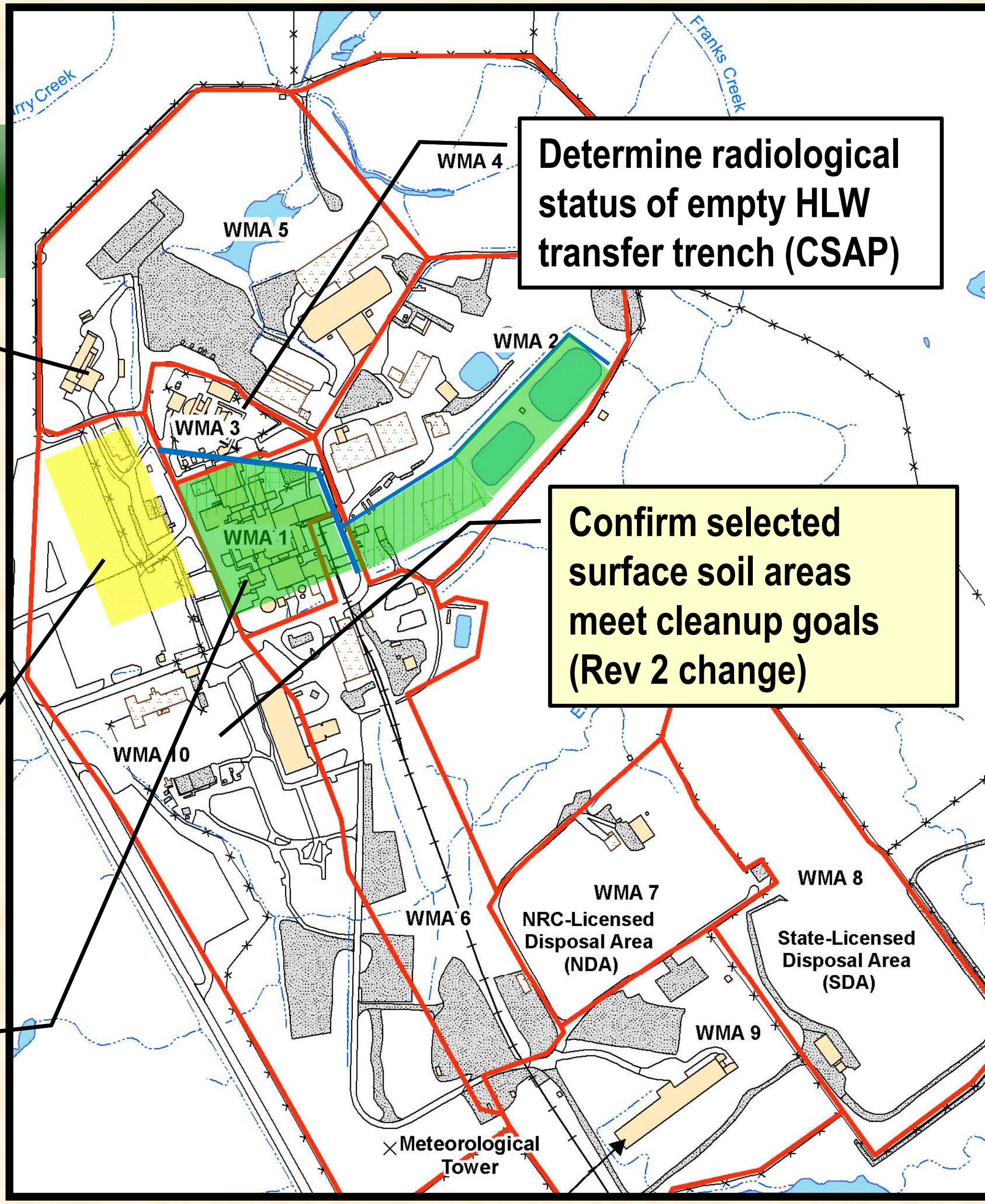
9C4 (35), (3 of 4)

Determine radiological status of soil in footprints of removed infrastructure (CSAP)

Surveys in footprints of some infrastructure complicated by remaining contaminated piping

Confirm areas potentially impacted by Phase 1 activities meet surface soil cleanup goals

Confirm bottom and lower sides of deep excavations meet subsurface soil cleanup goals, and that upper sides meet surface soil cleanup goals



Determine radiological status of empty HLW transfer trench (CSAP)

Confirm selected surface soil areas meet cleanup goals (Rev 2 change)

9C4 (35), final status survey plan details (4 of 4)

Key points on final status surveys (continued):

- The conceptual framework will address all key aspects of final status survey design, e.g.
  - Segregating areas into Classes 1, 2, or 3 based on contamination potential
  - Instrumentation and survey techniques
  - Establishing reference coordinate systems
  - Assuming the null hypothesis that residual radioactivity exceeds cleanup goals
  - Specifying decision errors, α = 0.05 and β to be developed based on analyses
  - Using the Sign test to test the null hypothesis
  - Role of composite sampling
  - Scanning technologies
  - Analytical methods

Does NRC have any comments on this approach?

Would it be acceptable to provide the conceptual framework in the comment response & incorporate all its provisions in the FSSP, but not include it in the DP?

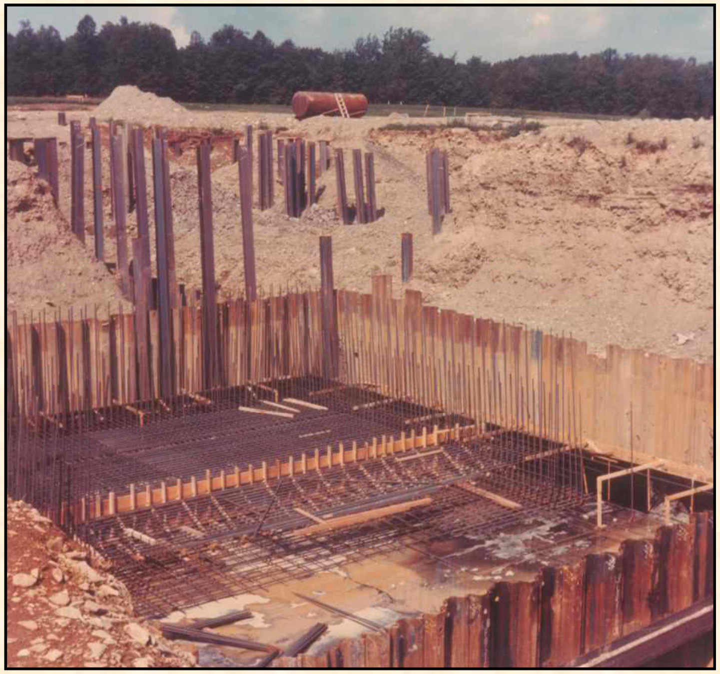
DC1 (36), recontamination potential and sheet pilings (1 of 2)

NRC path forward: Provide a more detailed discussion of the impact of the excavations on water flow patterns and summarize the experience with interlocking sheet piling.

Proposed DOE approach: Provide additional discussion as requested

Key elements in DOE approach:

- Bechtel used temporary interlocking sheet piling to support the excavation and construction of subsurface facilities including tanks 8D-1 and 8D-2 and the fuel storage and cask unloading pools
  - Historical photos show the pilings to be effective in controlling groundwater intrusion



DC1 (36), recontamination potential and sheet pilings (2 of 2)

Key elements in DOE approach (continued):

- To expand discussion in DP on sequence of actions associated with backfilling the excavation and removal of sheet piling
- To provide more detailed information to NRC later (final excavation designs)

Does NRC have any comments on this approach?

DC2 (37), impact of Phase 1 changes on Phase 2 (1 of 2)

NRC path forward: Provide an assessment of the Phase 1 alteration of the hydrologic system on potential Phase 2 decisions, or provide a description of how those impacts could be mitigated.

Proposed DOE approach: Provide additional discussion and information in Appendix D to demonstrate that the potential impacts of Phase 1 changes are understood

Key elements in DOE approach:

- The conceptual design in the DP describes the general design features of the WMA 1 and WMA 2 hydraulic barriers and is not intended as a final design
- The final design of the WMA 1 barrier wall and French drain will minimize groundwater flow into the area of the Waste Tank Farm

DC2 (37), impact of Phase 1 changes on Phase 2 (2 of 2)

Key elements in DOE approach (continued):

- The design of the North Plateau Permeable Treatment Wall (PTW) will consider the effect the proposed WMA 1 and WMA 2 barrier walls have on groundwater flow in the North Plateau
- A close-in-place scenario for the Waste Tank Farm would include a circumferential hydraulic barrier wall, groundwater extraction, and installation of multi-layered closure cap to limit infiltration of groundwater and precipitation.
- The final hydraulic barrier design will be provided for NRC review to allow comment on the final design details before installation

Does NRC have any comments on this approach?

DC3 (38), engineered barrier performance (1 of 2)

NRC path forward: Provide additional technical basis to justify that the performance goals of the engineered barrier systems are likely to be achieved, including but not limited to: a summary of slurry wall technology usage including problems, a demonstration that a hydraulic conductivity of 6E-6 cm/s will achieve the design goals, an evaluation of barrier performance with three feet of backfill subject to vehicle loading, a description of the design and monitoring of the French drain system to minimize silting, a comparison of the required performance period to the experience base for the engineered barriers, and a description of how it will be determined that the design goal hydraulic conductivities and mechanical strength have been achieved in the field.

Proposed DOE approach: Add discussion to Appendix D to address requirements for detailed design and initial testing of installed barrier walls

DC3 (38), engineered barrier performance (2 of 2)

Key elements in DOE approach:

- The conceptual design in the DP describes the general design features of the hydraulic barrier system and is not intended as a final design
- The designs of the WMA 1 and WMA 2 hydraulic barrier walls and French drain will be finalized by the decommissioning contractor once all of the required subsurface geotechnical data has been collected and evaluated and required engineering design completed
- The final design will identify and justify performance goals including but not limited to hydraulic conductivity, vehicle loading, French drain performance, and stability requirements (will be provided to NRC for review)
- Section 7.2.2 mitigative measures discussion will be expanded to address matters such as construction impacts (e.g., in areas where slurry is mixed) and avoiding damage to the barriers during Phase 1 activities

Does NRC have any comments on this approach?

DC4 (39), barrier corrective action program (1 of 2)

NRC path forward: Provide the conditions that lead to corrective actions of the engineered barriers and detail how evaluations of buried systems will be performed.

Proposed DOE approach: Incorporate the requested information in Appendix D

Key elements in DOE approach:

- The conceptual design in the DP describes the general design of the corrective action implementation program and is not intended as a final design
- Maintenance of elevated upgradient hydraulic heads
- Piezometers installed upgradient and downgradient of the barrier walls and French drain

DC4 (39), barrier corrective action program (2 of 2)

Key elements in DOE approach (continued):

- Routine monitoring of groundwater levels and radiological contamination indicator parameters to identify potential defects in the barriers
- Implement accepted industry corrective actions to repair defects
- The final corrective action implementation design and monitoring schedule will be provided for NRC review to allow comment on the final design of the corrective action program

Does NRC have any comments on this approach?

DC6 (41), barrier performance monitoring (1 of 2)

NRC path forward: Provide additional monitoring locations at the western end of the WMA 1 barrier wall both pre- and post-installation of the barrier, and specified monitoring schedules for the monitoring wells and piezometers.

Proposed DOE approach: Provide additional discussion in Appendix D and provide final design to NRC for review

Key elements in DOE approach:

- The conceptual design in the DP describes the general design features of the groundwater monitoring system and is not intended as a final design
- The groundwater monitoring design and monitoring schedule for the WMA 1 barrier wall will be finalized after the completion of the final WMA 1 barrier wall design by the decommissioning contractor

DC6 (41), barrier performance monitoring (2 of 2)

Key elements in DOE approach (continued):

- The final groundwater monitoring design and schedule will be provided for NRC review to allow comment on the final design details before installation

Does NRC have any comments on this approach?

DC7 (42), barrier wall stability (1 of 2)

NRC path forward: Provide the design details and analysis to demonstrate that the hydraulic barrier walls will be stable during excavations prior to backfilling under reasonably foreseeable loadings and scenarios.

Proposed DOE approach: Provide additional discussion in Appendix D and provide final design information to NRC for review

Key elements in DOE approach:

- The conceptual design in the DP describes the general design features of the hydraulic barrier system and is not intended as a final design
- The designs of the WMA 1 and WMA 2 hydraulic barrier walls and French drain will be finalized by the decommissioning contractor once all of the required subsurface geotechnical data has been collected and evaluated and required engineering design completed

DC7 (42), barrier wall stability (2 of 2)

Key elements in DOE approach (continued):

- The final design will address stability under different conditions
- The final hydraulic barrier design and stability calculations will be provided for NRC review to allow comment on the final design details before installation of the barrier walls

Does NRC have any comments on this approach?

DC8 (43), interactions with PRB and PTW (1 of 2)

NRC path forward: The design of these permeable reactive barriers/walls should balance the overall objective of preventing recontamination with the hydraulic barriers and remediation with the downgradient permeable reactive barriers, by taking into account the potentially lower groundwater flow rate as a result of installation of two upgradient hydraulic barrier walls. Perform a quantitative analysis to optimize the designs.

Proposed DOE approach: Provide additional discussion in Appendix D

Key elements in DOE approach:

- The installation of the Permeable Reactive Barrier (PRB) is no longer being considered
- The conceptual design in the DP describes the general design features of the hydraulic barrier system and is not intended as a final design

DC8 (43), interactions with PRB and PTW (2 of 2)

Key elements in DOE approach (continued):

- The PTW design contractor will consider the potential effect the proposed WMA 1 and WMA 2 hydraulic barrier walls and French drain have on groundwater flow in the North Plateau and the performance of the PTW

Does NRC have any comments on this approach?

DC9 (44), groundwater flow changes and WMA 3 (1 of 2)

NRC path forward: Conduct an analysis to evaluate the potential implications of increased groundwater flow towards the waste tank farm and ability of the tank and vault drying system to maintain the waste tanks/vaults in a safe configuration during the ongoing assessment period.

Proposed DOE approach: Provide additional discussion and information in Appendix D

Key elements in DOE approach:

- Such an analysis cannot be currently performed as the tank and vault drying system is currently being designed by WVES and is not expected to be completed until 2010
- The conceptual design in the DP describes the general design features of the WMA 1 and WMA 2 hydraulic barriers and is not intended as a final design

DC9 (44), groundwater flow changes and WMA 3 (2 of 2)

Key elements in DOE approach (continued):

- The final design of the WMA 1 barrier wall and French drain will consider the capabilities of the existing WTF dewatering system and the proposed tank/vault drying system
- The final hydraulic barrier design will be provided for NRC review to allow comment on the final design details before installation

Does NRC have any comments on this approach?

RAI comment responses and Revision 2 to the DP

- DOE plans to submit RAI comment responses to NRC by 8/14/09
  - Completion of the additional modeling and the probabilistic uncertainty analysis might take longer
  - The responses will provide details of the related changes in Revision 2 to the DP
- The date to submit DP Revision 2 to NRC under evaluation, will advise NRC
  - Planned to coordinate with issue of EIS ROD
- Revision 2 will include the RAI changes and
  - Changes to provide for release of some low potential areas in Phase 1 using surface soil cleanup goals
  - Changes to address NYSERDA comments, including 15 editorial comments and 33 additional comments submitted directly to DOE
  - Changes to incorporate information on the updated EIS erosion analysis
  - Changes to incorporate 2009 data changes from sample reanalysis
  - Changes of *would* to *will* and deleting *proposed* throughout the DP

In conclusion

- DOE has outlined its proposed approaches for responding to 33 comments to obtain NRC comments on their acceptability
  - Responses to the other 11 comments will be straightforward
- DOE plans to provide the CSAP to NRC for review by December 2009
- DOE plans to provide the FSSP to DOE for information by December 2009
- DOE can provide briefings to NRC on composite sampling plans and the probabilistic uncertainty analysis if that would be useful
  - The probabilistic uncertainty analysis and DOE decisions on the results should be completed in August 2009

Are there other matters that should be discussed today?

Would a follow-up meeting be worthwhile?