

Summary of the Resolution of the Key Technical Issue on Radionuclide Transport

Subissue #	Subissue Title	Status	NRC/DOE Agreements
1	Radionuclide Transport Through Porous Rock	Closed-Pending	<p>1) Provide the basis for the proportion of fracture flow through the Calico Hills non-welded vitric. DOE will revise the AMR <i>UZ Flow Models and Submodels</i> and the AMR <i>Calibrated Properties Model</i> to provide the technical basis for the proportion of fracture flow through the Calico Hills Nonwelded Vitric. These reports will be available to the NRC in FY 2002. In addition, the field data description will be documented in the AMR <i>In Situ Field Testing of Processes</i> in FY 2002.</p> <p>2) Provide analog radionuclide data from the tracer tests for Calico Hills at Busted Butte and from similar analog and radionuclide data (if available) from test blocks from Busted Butte. DOE will provide data from tracers used at Busted Butte and data from (AECL) test blocks from Busted Butte in an update to the AMR <i>In Situ Field Testing of Processes</i> in FY 2002.</p> <p>3) Provide the screening criteria for the radionuclides selected for PA. Provide the technical basis for selection of the radionuclides that are transported via colloids in the TSPA. The screening criteria for radionuclides selected for TSPA are contained in the AMR <i>Inventory Abstraction</i>. DOE is documenting identification of radionuclides transported via colloids for TSPA in the AMR <i>Waste Form Colloid-Associated Concentration Limits: Abstraction and Summary</i>, in the TSPA-SR Technical Report, and in the TSPA-SR Model Document. These documents will be available to the NRC in January 2001.</p>

1	Radionuclide Transport Through Porous Rock - Cont.		<p>4) Provide sensitivity studies on K_d for plutonium, uranium, and protactinium to evaluate the adequacy of the data. DOE will analyze column test data to determine whether, under the flow rates pertinent to the Yucca Mountain flow system, plutonium sorption kinetics are important to performance. If they are found to be important, DOE will also perform sensitivity analyses for uranium, protactinium, and plutonium to evaluate the adequacy of K_d data. The results of this work will be documented in an update to the AMR <i>Unsaturated Zone and Saturated Zone Transport Properties</i> available to the NRC in FY 2002.</p> <p>5) Provide additional documentation to explain how transport parameters used for performance assessment were derived in a manner consistent with NUREG-1563, as applicable. Consistent with the less structured approach for informal expert judgment acknowledged in NUREG-1563 guidance and consistent with DOE procedure AP-3.10Q, DOE will document how it derived the transport parameter distributions for performance assessment, in a report expected to be available in FY 2002.</p>
2	Radionuclide Transport Through Alluvium	Closed-Pending	<p>1) Provide further justification for the range of effective porosity in alluvium, considering possible effects of contrasts in hydrologic properties of layers observed in wells along potential flow paths. DOE will use data obtained from the Nye County Drilling Program, available geophysical data, aeromagnetic data, and results from the Alluvium Testing Complex testing to justify the range of effective porosity in alluvium, considering possible effects of contrasts in hydrologic properties of layers observed in wells along potential flowpaths. The justification will be provided in the <i>Alluvial Testing Complex</i> AMR due in FY 2003.</p> <p>2) The DOE should demonstrate that TSPA captures the spatial variability of parameters affecting radionuclide transport in alluvium. DOE will demonstrate that TSPA captures the variability of parameters affecting radionuclide transport in alluvium. This information will be provided in the TSPA-LA document due in FY 2003.</p>

2	Radionuclide Transport Through Alluvium - Cont.		<p>3) Provide a detailed testing plan for alluvial testing (the ATC and Nye County Drilling Program) to reduce uncertainty (for example, the plan should give details about hydraulic and tracer tests at the well 19 complex and it should also identify locations for alluvium complex testing wells and tests and logging to be performed). NRC will review the plan and provide comments, if any, for DOE's consideration. In support and preparation for the October/November 2000 Saturated Zone meeting, DOE provided work plans for the Alluvium Testing Complex and the Nye County Drilling Program (FWP-SBD-99-002, Alluvial Tracer Testing Field Work Package, and FWP-SBD-99-001, Nye County Early Warning Drilling Program, Phase II and Alluvial Testing Complex Drilling). DOE will provide test plans of the style of the Alcove 8 plan as they become available. The plan will be amended to include laboratory testing. In addition, the NRC On Site Representative attends DOE/Nye County planning meetings and is made aware of all plans and updates to plans as they are made.</p> <p>4) The NRC needs DOE to document the pre-test predictions for the ATC. DOE will document pretest predictions for the Alluvial Testing Complex in the <i>SZ In Situ Testing</i> AMR available in October 2001.</p> <p>5) Provide the laboratory testing plan for laboratory radionuclide transport studies. NRC will review the plan and provide comments, if any, for DOE's consideration. In support and preparation for the October/November 2000 Saturated Zone meeting, DOE provided work plans for the Alluvium Testing Complex and the Nye County Drilling Program (FWP-SBD-99-002, Alluvial Tracer Testing Field Work Package, and FWP-SBD-99-001, Nye County Early Warning Drilling Program, Phase II and Alluvial Testing Complex Drilling). DOE will provide test plans of the style of the Alcove 8 plan as they become available. The plan will be amended to include laboratory testing. In addition, the NRC On Site Representative attends DOE/Nye County planning meetings and is made aware of all plans and updates to plans as they are made.</p>
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2	Radionuclide Transport Through Alluvium - Cont.		<p>6) If credit is taken for retardation in alluvium, the DOE should conduct K_d testing for radionuclides important to performance using alluvium samples and water compositions that are representative of the full range of lithologies and water chemistries present within the expected flow paths (or consider alternatives such as testing with less disturbed samples, use of samples from more accessible analog sites (e.g., 40-mile Wash), detailed process level modeling, or other means). DOE will conduct K_d experiments on alluvium using samples from the suite of samples obtained from the existing drilling program; or, DOE will consider supplementing the samples available for testing from the alternatives presented by the NRC. This information will be documented in an update to the <i>SZ In Situ Testing</i> AMR, available in FY 2003. K_d parameter distributions for TSPA will consider the uncertainties that arise from the experimental methods and measurements.</p> <p>7) Provide the testing results for the alluvial and laboratory testing. DOE will provide testing results for the alluvial field and laboratory testing in an update to the <i>SZ In Situ Testing</i> AMR available in FY 2003.</p> <p>8) Provide additional information to further justify the uncertainty distribution of flow path lengths in the alluvium. This information currently resides in the <i>Uncertainty Distribution for Stochastic Parameters</i> AMR. DOE will provide additional information, to include Nye County data as available, to further justify the uncertainty distribution of flowpath lengths in alluvium in updates to the <i>Uncertainty Distribution for Stochastic Parameters</i> AMR and to the <i>Saturated Zone Flow and Transport</i> PMR, both expected to be available in FY 2002.</p> <p>9) Provide the hydro-stratigraphic cross-sections that include the Nye County data. DOE will provide the hydrostratigraphic cross sections in an update to the <i>Hydrogeologic Framework Model for The Saturated Zone Site-Scale Flow and Transport Model</i> AMR expected to be available during FY 2002, subject to availability of Nye County data.</p>
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2	Radionuclide Transport Through Alluvium - Cont.		<p>10) Provide additional documentation to explain how transport parameters used for PA were derived in a manner consistent with NUREG-1563, as applicable. Consistent with the less structured approach for informal expert judgment acknowledged in NUREG-1563 guidance and consistent with AP-3.10Q, DOE will document how it derived the transport distributions for performance assessment, in a report expected to be available in FY 2002.</p> <p>11) Provide the updated UZ Flow and Transport and the SZ Flow and Transport FEPs AMRs. DOE will provide updates to the AMRs <i>Features, Events, and Processes in UZ Flow and Transport</i> and <i>Features, Events, and Processes in SZ Flow and Transport</i>, both available in January 2001.</p>
3	Radionuclide Transport Through Fractured Rock	Closed-Pending	<p>1) For transport through fault zones below the repository, provide the technical basis for parameters/distributions (consider obtaining additional information, for example, the sampling of wells WT-1 and WT-2), or show the parameters are not important to performance. DOE will provide a technical basis for the importance to performance of transport through fault zones below the repository. This information will be provided in an update to the AMR <i>Radionuclide Transport Models Under Ambient Conditions</i> available to the NRC in FY 2002. If such transport is found to be important to performance, DOE will provide the technical basis for the parameters/distributions used in FY 2002. DOE will consider obtaining additional information.</p> <p>2) Provide the analysis of geochemical data used for support of the flow field below the repository. DOE will provide the analysis of geochemical data used for support of the fluid flow patterns in the AMR <i>UZ Flow Models and Submodels</i>, available to the NRC in FY 2002.</p>

3	Radionuclide Transport Through Fractured Rock - Cont.	<p>3) Provide additional information to further justify the uncertainty distribution of flow path lengths in the tuff. This information currently resides in the <i>Uncertainty Distribution for Stochastic Parameters</i> AMR. DOE will provide additional information, to include Nye County data as available, to further justify the uncertainty distribution of flowpath lengths from the tuff at the water table through the alluvium at the compliance boundary in updates to the <i>Uncertainty Distribution for Stochastic Parameters</i> AMR and to the <i>Saturated Zone Flow and Transport</i> Process Model Report, both expected to be available in FY 2002.</p> <p>4) Provide sensitivity studies for the relative importance of the hydrogeological units beneath the repository for transport of radionuclides important to performance. DOE will provide a sensitivity study to fully evaluate the relative importance of the different units below the repository that could be used to prioritize data collection, testing, and analysis. This study will be documented in an update to the AMR <i>Radionuclide Transport Models Under Ambient Conditions</i> available to the NRC in FY 2002.</p> <p>5) Provide the documentation for the Alcove 8/Niche 3 testing and predictive modeling for the unsaturated zone. DOE will provide documentation for the Alcove 8 / Niche 3 testing and predictive modeling for the unsaturated zone in updates to the AMRs <i>In Situ Field Testing of Processes</i> and <i>Radionuclide Transport Models Under Ambient Conditions</i>, both available to the NRC in FY 2002.</p> <p>6) The NRC needs DOE to document the pre-test predictions for the Alcove 8/Niche 3 work. DOE responded that pre-test predictions for Alcove 8 Niche 3 work will be provided to NRC via letter report (Brocoum to Greeves) by mid-January 2001.</p>
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3	Radionuclide Transport Through Fractured Rock - Cont.	<p>7) Provide sensitivity studies to test the importance of colloid transport parameters and models to performance for UZ and SZ. Consider techniques to test colloid transport in the Alcove 8/Niche 3 test (for example, microspheres). DOE will perform sensitivity studies as the basis for consideration of the importance of colloid transport parameters and models to performance for the unsaturated and saturated zones and will document the results in updates to appropriate AMRs, and in the TSPA-LA document, all to be available in FY 2003. DOE will evaluate techniques to test colloidal transport in Alcove 8 / Niche 3 and provide a response to the NRC in February 2001.</p> <p>8) Provide justification that microspheres can be used as analogs for colloids (for example, equivalent ranges in size, charge, etc.). DOE will provide documentation in the C-Wells AMR to provide additional justification that microspheres can be used as analogs for colloids. The C-Wells AMR will be available to the NRC in October 2001.</p> <p>9) Provide the documentation for the C-wells testing. Use the field test data or provide justification that the data from the laboratory tests is consistent with the data from the field tests. DOE will provide the C-Wells test documentation and will either use the test data or provide a justified reconciliation of the lab and field test data in the C-Wells AMR available in October 2001.</p> <p>10) Provide analog radionuclide data from the tracer tests for Calico Hills at Busted Butte and from similar analog and radionuclide data (if available) from test blocks from Busted Butte. DOE will provide data from analog tracers used at Busted Butte and data from (AECL) test blocks from Busted Butte in an update to the AMR <i>In Situ Field Testing of Processes</i> in FY 2002.</p>
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