

Summary of Activities for Methodology and Overall System Performance (MOSP) Gaps 2–5, 9, 10, and 13

The currently planned Center for Nuclear Waste Regulatory Analyses (CNWRA) activities to support the MOSP technical area are outlined in Section 2.20 of the Draft CNWRA Operations Plans for the High-Level Waste Repository Safety Program–Revision 22, Change 1. The described activities are organized according to 14 information gaps identified for the MOSP technical area. For each information gap, a set of proposed activities, products, and schedule is outlined. Information Gaps 2–5, 9, 10, and 13 involve activities such as team building, information gathering, and other preparations to ensure readiness to conduct a license application review and, thus, do not identify specific topical technical reports as work products. For these gaps, the work products are quarterly summaries of activities. Accordingly, the following summary of activities and progress is provided for MOSP Information Gaps 2–5, 9, 10, and 13.

Information Gap 2

Information Gap 2 pertains to the requirement for demonstration of multiple barriers in a license application and the preparations needed to be ready to review the multiple barriers demonstration. U.S. Nuclear Regulatory Commission (NRC) and CNWRA staffs need to understand what system components may provide barrier capabilities. Dr. Olufemi Osidele is the CNWRA point of contact for activities related to this information gap. The following specific activities were conducted to address this gap during the second quarter of fiscal year 2008.

- CNWRA and NRC staffs continued training Integrated Subissue teams to ensure effective implementation of the multiple barriers review strategy. Training tailored to specific Integrated Subissue teams was developed during the last quarter and was provided to all of the teams during a series of internal CNWRA-NRC workshops on the U.S. Department of Energy (DOE) Total System Performance Assessment for the Supplemental Environmental Impact Statement (TSPA-SEIS). This training activity is now complete.
- CNWRA and NRC staffs continued to review available DOE documents to identify system components that could potentially be identified as barriers in a potential license application. This review activity directly supported preparations for a DOE-NRC technical exchange on Total System Performance Assessment that was held April 3–4 in Las Vegas, Nevada.
- Analyses to support updated risk-insights were performed using the Total-system Performance Assessment (TPA) Version 5.1 code. Results of these analyses were presented and discussed with NRC staff during three telephone conferences. These analyses provide insight into the relevance of the system components as potential barriers. The results of these analyses will be documented in an intermediate milestone report that will be delivered in the third quarter.
- CNWRA and NRC staffs jointly developed draft Safety Evaluation Report outlines for System Description and Demonstration of Multiple Barriers.

Activities for Information Gap 2 are essentially complete. The System Description and Demonstration of Multiple Barriers team is well prepared to implement its review strategy. Staff will continue to review any new or revised DOE documents that may provide new information

related to potential barrier capabilities and will continue to interact with Integrated Subissue teams to maintain readiness for review of a potential license application.

Information Gap 3

Information Gap 3 pertains to the scenario analysis review strategy, which addresses the need to verify that Integrated Subissue teams know which DOE documents provide scenario-screening analyses for features, events, and processes, and which screening arguments they would be responsible for reviewing in a potential license application. When reviewing scenario analyses, teams will need to use available risk information so that the appropriate level of effort is applied to the reviews. Dr. Osvaldo Pensado is the CNWRA point of contact for activities related to this information gap. The following specific activities were conducted to address this gap during the second quarter of fiscal year 2008.

- As a continuing activity from the previous quarter, Integrated Subissue teams were asked to review and suggest revisions to a spreadsheet used to track assignments of the reviews of DOE screening arguments for features, events, and processes. This activity is now complete, and the spreadsheet will be available for use for the potential review of a license application.
- CNWRA and NRC staffs continued the training Integrated Subissue teams to ensure effective implementation of the scenario analysis review strategy. Training tailored to specific Integrated Subissue teams was developed during the last quarter and was provided to all of the teams during a series of internal CNWRA-NRC workshops on the DOE TSPA-SEIS. Teams were shown how the spreadsheet table will track team assignments and results of their reviews. This training activity is now complete.
- CNWRA and NRC staffs jointly developed draft Safety Evaluation Report outlines for Scenario Analysis and Identification of Events with Probabilities Greater Than 10^{-8} Per Year.

Activities for Information Gap 3 are essentially complete. The Scenario Analysis team is well prepared to implement its review strategy. Staff will continue to review any new or revised DOE documents that may provide new information related to scenario screening and identification of events with probabilities greater than 10^{-8} per year. This team also will continue to interact with Integrated Subissue teams to maintain readiness for review of a potential license application.

Information Gap 4

Information Gap 4 pertains to ensuring that all Integrated Subissue teams consistently review Model Abstractions. Mr. James Winterle is the CNWRA point of contact for activities related to this information gap. The following specific activities were conducted to address this gap during the second quarter of fiscal year 2008.

- During the second quarter of fiscal year 2008, the DOE released and provided the electronic GoldSim input and output data files for its TSPA-SEIS. Although this is not the final model that will be used to support a license application, it is a reasonable assumption that this version of the model will be very close, in terms of structure and overall implementation, to the model DOE would use to support a June 2008 license application. CNWRA staff provided several areas of support to NRC activities related to study of the

DOE TSPA-SEIS model. Specific accomplishments in support of this activity include the following.

- CNWRA staff continued to make progress toward ensuring the necessary equipment and software infrastructure will be available for Integrated Subissue teams to access the GoldSim-based DOE Total System Performance Assessment models. Specifically, CNWRA staff (i) installed GoldSim software on conference room computers so that the DOE model can be accessed and viewed on a large screen for team workshop settings; (ii) obtained the free downloadable GoldSim Player software, which can be used to view and execute existing GoldSim-based models; and (iii) began converting some of the original DOE TSPA-SEIS models into the correct format for use with the free GoldSim Player software.
- CNWRA staff continued to review the DOE TSPA-SEIS model. This activity included interactions with the NRC staff and internal meetings and discussions to become familiar with the contents of the electronic data files for the DOE TSPA-SEIS model and the *exdoc.dll* postprocessing code.
- CNWRA and NRC staffs completed a series of workshops to introduce the Integrated Subissue teams to the DOE TSPA-SEIS model. This activity included development of agendas and presentation materials for several topic-specific workshops. During these workshops, teams were also trained on the review strategy for demonstration of multiple barriers; this is the training referred to under the previously listed activities for Information Gap 2.
- CNWRA and NRC staffs continued to train Integrated Subissue teams and ensure effective implementation of model abstraction acceptance criteria in the Yucca Mountain Review Plan. This activity is being accomplished in conjunction with the previously mentioned workshops on the DOE TSPA-SEIS model. During these workshops, teams were reminded that acceptance criteria should be applied in a risk-informed manner considering the potential reliance on models and submodels for demonstrating barrier capabilities. Also in support of this activity, CNWRA and NRC staffs participated in tabletop training exercises that involved walking through steps in the licensing review project plan in a team setting.
- CNWRA staff supported preparations for a DOE-NRC technical exchange on Total-System Performance Assessment that was held April 3–4, 2008, in Las Vegas, Nevada. This activity included reviewing recently released DOE documentation of its modeling approach for a license application and arranging meetings with Integrated Subissue teams to discuss technical topics and specific questions for which clarifications could be sought from DOE during the technical exchange.
- The CNWRA staff continued to improve overall readiness during the prelicensing period by reviewing publicly available documents that can aid in the understanding of potential barriers, their capabilities, and their technical bases.

Activities for Information Gap 4 are effectively complete in terms of developing the expertise and infrastructure necessary to understand and evaluate the implementation of model abstractions in GoldSim-based DOE Total System Performance Assessment models. In the next quarter, CNWRA staff will continue to review DOE documentation and complete installations of GoldSim software and reformatting of TSPA-SEIS models into the GoldSim Player format.

Information Gap 5

Information Gap 5 pertains to the need to develop a review strategy for Demonstration of Compliance with Postclosure Public Health and Environmental Standards. Dr. Osvaldo Pensado is the CNWRA point of contact for activities related to this information gap. The following specific activities were conducted to address this gap during the second quarter of fiscal year 2008.

- CNWRA and NRC staffs developed a draft Safety Evaluation Report outline.
- CNWRA staff members also continued reviewing available DOE documents on methods used for combining dose estimates from various scenarios by probability weighting and have achieved an in-depth understanding of how DOE implemented these methods in its *exdoc.dll* postprocessing code. Calculations were performed to independently replicate outputs from the *exdoc.dll* code.

Significant progress has been made in understanding DOE approaches for demonstration of compliance with postclosure public health and environmental standards. Activities for Information Gap 5 are effectively complete. Staff will maintain readiness by continuing to review available information related to this topic.

Information Gap 9

Information Gap 9 pertains to the need to review the DOE technical basis for estimating peak seismic ground velocities in its postclosure performance assessment. DOE has indicated it will revise its approach to address previous NRC comments, but DOE has not committed to a revised report prior to submitting a license application. Dr. James Mancillas is the CNWRA point of contact for activities related to this information gap. The following specific activities were conducted to address this gap during the second quarter of fiscal year 2008.

- CNWRA and NRC staffs contributed to a draft Safety Evaluation Report outline for Identification of Events With Probabilities Greater Than 10^{-8} Per Year, which includes the topic of seismic activity.
- Staff continued to examine the DOE TSPA-SEIS model and supporting documents and have developed an understanding of the DOE approach for incorporating seismic probability and consequence estimate models. The CNWRA and NRC staffs also continued to examine the DOE treatment of aleatory and epistemic uncertainties in the TSPA-SEIS seismic scenario, including the methods used to estimate mean consequences as function of numerical integrals of probability density functions. The review of these calculations supported completion of Information Gap 5.

Activities for Information Gap 9 are effectively complete. The CNWRA staff has developed a thorough understanding of the DOE approach to including postclosure seismic activity and is prepared to evaluate the technical basis for this approach in a potential license application. Staff will maintain readiness by continuing to review available information related to this topic.

Information Gap 10

Information Gap 10 pertains to the need to review DOE documents and its approach for estimating probability for igneous activity. Dr. Nancy Adams is the CNWRA point of contact for activities related to this information gap. The following specific activities were conducted to address this gap during the second quarter of fiscal year 2008.

- CNWRA and NRC staffs contributed to a draft Safety Evaluation Report outline for Identification of Events With Probabilities Greater Than 10^{-8} Per Year, which includes the topic of igneous event probability.
- Staff continued to examine the DOE TSPA-SEIS model and supporting documents and have developed an understanding of the DOE approach for estimating the probability of igneous activity.

Activities for Information Gap 10 are effectively complete. The CNWRA staff has developed a thorough understanding of the DOE approach for estimating igneous probability and is prepared to evaluate the technical basis in a potential license application. Staff will continue to review available information related to igneous probability.

Information Gap 13

Information Gap 13 pertains to understanding how confidence in peak mean dose estimates can be assessed in cases where mean dose estimates obtained from many realizations may be dominated by a few extreme events. Dr. Osvaldo Pensado is the CNWRA point of contact for activities related to this information gap. During the first quarter of fiscal year 2008, CNWRA staff used the TPA Version 5.1 code to evaluate the effects of model and parameter uncertainties on the stability of peak mean dose estimates. Some preliminary results of these analyses were presented to NRC staff via a telephone conference on November 7, 2007. The insights obtained from this work will be useful for understanding factors that may affect confidence in peak mean dose estimates. No additional activity on this topic was conducted during the second quarter. Presently, there are no plans to conduct additional analyses or to document the preliminary results in a formal report. Information Gap 13 can be considered complete.

In summary, all of the MOSP information gaps identified in the Draft CNWRA Operations Plans for the High-Level Waste Repository Safety Program are effectively complete. NRC and CNWRA staffs have worked well together and are prepared for a potential June 2008 DOE license application submission by DOE. CNWRA activities were pursued in close cooperation with the NRC project officer and other NRC staff.