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MEMORANDUM TO: John H. Austin, Chief
Performance Assessment and HLW
Integration Branch, DWM
Office of Nuclear Material Safety and Safeguards

FROM: Christiana H. Lui K. McConnell for Chi
Performance Assessment and Integration Section
Performance Assessment and HLW
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SUBJECT: TRIP REPORT FOR PROBABILISTIC SEISMIC HAZARD ANALYSIS - SEISMIC SOURCE CHARACTERIZATION EXPERT TEAM ELICITATION INTERVIEW, SAN FRANCISCO, CA, MARCH 7, 1997

DOE extended an invitation to the staff to observe one of the six three-member seismic source characterization (SSC) expert team elicitation interviews for the proposed high-level waste repository at Yucca Mountain (YM), Nevada. This elicitation interview, the last one of the six, was held at Geomatrix Consultants, Inc., San Francisco, CA, on March 7, 1997. The attendees and their respective roles were:

NAME	AFFILIATION	ROLE
Kevin Coppersmith	Geomatrix	Facilitation Team (FT) - Technical Facilitator Integrator (TFI)
Roseanne Perman	Geomatrix	Facilitation Team - Notetaker
Robert Youngs	Geomatrix	Facilitation Team
Peter Morris	Applied Decision Analysis	Facilitation Team - Normative Expert
Robert Smith	University of Utah	Expert Team Member
Craig dePolo	University of Nevada at Reno	Expert Team Member
Dennis O'Leary*	U.S. Geological Survey	Expert Team Member
Christiana Lui	USNRC	Observer

* Dennis O'Leary replaced Christopher Menges (U.S. Geological Survey) on this expert team due to C. Menges' unforeseen illness.

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The objectives of this elicitation interview were to: (1) assist the expert team to establish the logic structure for displaying alternative approaches and quantifying uncertainties; (2) understand the methodology adopted by the expert team; (3) go through a selective set of assessments to identify any potential problem areas and to coach the team through these areas, and (4) answer any questions raised by the expert team. Basically, this elicitation interview provided an opportunity for a small group discussion on issues that are particular to this expert team. The elicitation notes taken during this elicitation interview will be compiled by Geomatrix and sent to the expert team for review. This reviewed document then becomes the rationale for this expert team's preliminary assessments.

Topics covered in this SSC elicitation interview included tectonic models, seismic sources, maximum magnitude earthquake (M_{max}), recurrence models and fault displacement. The team divided the YM region into several seismicity source zones and used "smoothing" functions to account for spatial variations in seismicity within each zone. The expert team (ET) and the FT discussed the choice of appropriate smoothing functions. To avoid double counting, the ET chose to implement "hard" boundaries between adjacent zones. To estimate M_{max}, the ET's basic approach was to use a Gaussian distribution for the magnitude. The FT stated that the upper tail should be estimated out to the 95th percentile or around 2σ. The FT also advised the ET to reconsider the value chosen for the upper tail. The upper tail should not just account for events that have been observed, but also extreme events that may occur in the future based on the ET's judgment.

A significant portion of this elicitation interview was devoted to discussing an appropriate and consistent framework to encode the ET's approaches and uncertainties in a logic tree, particularly in the areas of tectonic models and recurrence models. The discussions centered on two essential features of the logic tree:

- how to arrange the headings (or top events) in a logical fashion sequentially, and
- how to formulate mutually exclusive and collectively exhaustive branches under each heading.

The FT (Kevin Coppersmith and Robert Youngs) elicited the ET's thought process and assisted the ET in developing a suitable framework for the logic tree. The TFI did stress through out this interview that it was the ET's decision whether to adopt the framework developed/inspired during this interview in their assessments.

The ET laid out their preliminary approach for fault displacement and requested assistance from the FT for additional calculations and relevant data. The TFI felt that the ET's approach was similar to another team's approach (J. McCalpin, J. Ake and D. B. Slemmons) in this area, and shared that team's approach with the ET. Craig dePolo indicated that he would contact J. McCalpin and ask for that team's rationale. The TFI also indicated that Susan Olig (Woodard-Clyde) might have some useful information in this area.

Additional points observed:

- This ET seemed to have some difficulty in using the logic tree to display their approaches and uncertainties. According the to TFI, this was not the first ET that had difficulty. Most previous ETs also had difficulty, and the elicitation interviews were focused on assisting the ETs in sorting through their approaches and developing the suitable logic tree framework for their approaches.

- During this elicitation interview, almost no numerical results were discussed between the ET and FT. Although the normative expert was present, his expertise was not called upon during this elicitation interview. In addition, the normative expert indicated that he was not always present during the previous elicitation interviews.

The next SSC workshop will be held at Salt Lake City, Utah, on April 14-16, 1997. The main goal of this workshop will be to provide feedback to the expert teams on their assessments after their preliminary assessments have been aggregated and propagated through the probabilistic seismic hazard analysis by the Calculations Team. There will be a joint afternoon session with the ground motion experts to review the results on the last day. The expert teams can change their assessments after this feedback workshop. All final numerical results and source models are due from the ETs to the FT by May 1, 1997, and the rationale is due by mid-May, 1997.

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