



Department of Energy

Washington, DC 20585

QA: L

SEP 06 1997

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Characterization Project  
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ISSUANCE OF SURVEILLANCE RECORD M&O-SR-97-054 RESULTING FROM THE OFFICE OF QUALITY ASSURANCE (OQA) SURVEILLANCE OF THE CIVILIAN RADIOACTIVE WASTE MANAGEMENT SYSTEM MANAGEMENT & OPERATING CONTRACTOR (CRWMS M&O)

Enclosed is the Record of Surveillance M&O-SR-97-054 conducted by the OQA of the CRWMS M&O facility in Las Vegas, Nevada, August 11 through September 9, 1997.

The purpose of the surveillance was to evaluate the process used by the CRWMS M&O to conduct expert elicitation, including selection, qualification, training, elicitation interviews, and documentation of elicitations. An evaluation of the process used by the CRWMS M&O was compared to the NUREG-1563, "Branch Technical Position on the use of Expert Elicitation in the High-Level Radioactive Waste Program."

Based on documentation reviews and personnel interviews, it has been determined that the overall implementation and adequacy of expert elicitation activities are effective. One Deficiency Report (DR) was issued as a result of the surveillance which identified that CRWMS M&O expert elicitation are being conducted without the use of a formal procedure that defines the step-by-step process of performing an expert elicitation. Response to the DR, which was transmitted via separate letter, is due by the date indicated in Block 12. Additionally, five recommendations are provided for the CRWMS M&O consideration to improve the expert elicitation process.

This surveillance is considered completed and closed as of the date of this letter. A response to this surveillance record is not required; however, the open DR will continue to be tracked until it is closed to the satisfaction of the quality assurance representative and the Director, OQA.

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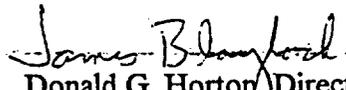


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If you have any questions, please contact either James Blaylock at (702) 794-1420 or Robert P. Hasson at (702) 794-5023.

  
Donald G. Horton, Director  
Office of Quality Assurance

OQA:JB-2420

Enclosure:  
Surveillance Record M&O-SR-97-054

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OFFICE OF CIVILIAN  
RADIOACTIVE WASTE MANAGEMENT  
U.S. DEPARTMENT OF ENERGY  
WASHINGTON, D.C.

Surveillance No. M&amp;O-SR-97-054

**QUALITY ASSURANCE SURVEILLANCE RECORD**

**SURVEILLANCE DATA**

1. ORGANIZATION/LOCATION: Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O) / Las Vegas, NV	2. SUBJECT: M&O Use of Expert Elicitation	3. DATE: July 30, 1997
4. SURVEILLANCE OBJECTIVE:  Verify compliance to procedures that control the process of expert elicitation.		
5. SURVEILLANCE SCOPE:  Evaluate the process used by the M&O to conduct expert elicitation, including selection, qualification, training, elicitation interviews, and documentation of elicitation. An evaluation of the process used by the M&O will be compared to the NUREG-1563 "Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program."		6. SURVEILLANCE TEAM: Team Leader: <u>Robert P. Hasson</u> Additional Team Members <u>James Blaylock</u> <u>Michael A. Goyda</u>
7. PREPARED BY: <u>Robert P. Hasson</u> Robert P. Hasson Surveillance Team Leader	<u>7/23/97</u> Date	8. CONCURRENCE: <u>James Blaylock</u> <u>Donald G. Horton</u> Director, OQA
<u>7/31/97</u> Date		

**SURVEILLANCE RESULTS**

9. BASIS OF EVALUATION/DESCRIPTION OF OBSERVATIONS: <b>SUMMARY</b> A surveillance was conducted August 11 through September 9, 1997, to evaluate the CRWMS M&O Regulatory Operations process to conduct expert elicitation.  Overall, the process used to perform the expert elicitation was considered to be effective by the surveillance team. However, one deficiency was identified. The expert elicitation activities were not performed in accordance with a formal procedure which resulted in the issuance of Deficiency Report (DR) YM-97-D-88. Additionally, five recommendations are provided for CRWMS M&O's consideration to improve the expert elicitation process.  Based on the lack of a formal procedure in place, the surveillance team evaluated the expert elicitation process used by CRWMS M&O to NUREG-1563, "Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program" and determined that the elicitation reviewed were generally in accordance with the NUREG-1563 guidance. CRWMS M&O provided documentation to take an exception from documenting the rationale for any revisions of elicited judgements which is a deviation from NUREG-1563.  See Pages 2-9...	
10. SURVEILLANCE CONCLUSIONS:  Based on documentation reviews and personnel interviews, it has been determined that the overall implementation and adequacy of the expert elicitation activities are effective. There was one DR issued as a result of this surveillance which identified that the M&O does not have a formal procedure that defines the step-by-step process of performing an expert elicitation. Although no procedure was in place, NUREG-1563 guidance was generally followed.	
11. COMPLETED BY: <u>Robert P. Hasson</u> Robert P. Hasson Surveillance Team Leader	<u>9/17/97</u> Date
12. APPROVED BY: <u>James Blaylock</u> Director, OQA	<u>10/6/97</u> Date

## **9. BASIS FOR EVALUATION/DESCRIPTION OF OBSERVATIONS: (Cont'd)**

### **SUMMARY (Cont'd)**

The M&O personnel tasked with the responsibility for managing the expert elicitation activities are knowledgeable in the use and application of guidance provided by NUREG-1563.

Documentation improvements made in the latest expert elicitation, Final Report Waste Package Degradation Expert Elicitation (WPDEE), reviewed by the surveillance team was found to be positive and should minimize questions during the licensing reviews.

### **DISCUSSION**

The surveillance team reviewed expert elicitation reports and associated documentation for the "Probabilistic Volcanic Hazard Analysis (PVHA) for Yucca Mountain, Nevada," and "Final Report Waste Package Degradation Expert Elicitation Project," (only the PVHA expert elicitation has been submitted as a final records package). Project Plans that are developed prior to the elicitation were reviewed for the "Saturated Zone Flow and Transport Expert Elicitation" and "Expert Elicitation Project for Unsaturated-Zone Flow Model." The following is a summary of the surveillance team's evaluation of expert elicitation conducted by the M&O in accordance with the steps outlined in NUREG-1563.

#### **Step 1 - DEFINITION OF OBJECTIVES**

The objectives of the expert elicitation were explicitly defined in a manner that reflects a clear understanding of how the judgements obtained will be used in subsequent analyses. This was accomplished in both the PVHA and WPDEE reports and project plans.

#### **Step 2 - SELECTION OF EXPERTS**

The normative expert and generalists were found to be selected prior to the subject-matter experts. The normative expert selected has been from Applied Decision Analysis, Inc. The generalists have been selected from Geomatrix Consultants, Inc., the M&O, and DOE personnel. The generalists are also known as the Methodology Development Team (MDT). Geomatrix Consultants, Inc. is tasked with facilitation responsibilities for the expert elicitation.

The normative experts and generalists generated and applied specific criteria for the selection of the subject-matter experts. Letters are sent out requesting nominations from knowledgeable individuals which includes the selection criteria established for the subject-matter experts.

The subject-matter experts were selected for the expert elicitation based on possessing the necessary knowledge and expertise, having demonstrated their ability to apply their knowledge and expertise, and representing a broad diversity of independent opinion and approaches for addressing the topic(s) in question. Additionally, the subject-matter experts were willing to be identified publicly with their judgements, and willing to publicly disclose all potential conflicts of interest.

During the review of documentation for the selection of subject-matter experts for the PVHA, the surveillance team found that Dr. Bruce Crowe was selected as one of the expert elicitation board members. This appeared to violate the selection criteria of independence since Dr. Crowe was the Las Alamos Principal Investigator for the work. Two of the subject-matter experts opposed this selection since there was a perception that Dr. Crowe had a bias in favor of the original results of the PVHA. However, the MDT decided to utilize Dr. Crowe for the PVHA. Based on a review of the documentation and final report, there was no evidence that Dr. Crowe's position or judgement had an adverse affect on the expert elicitation process in regard to the (aggregate) summary of results.

### **Step 3 - REFINEMENT OF ISSUES AND PROBLEM DECOMPOSITION**

It was verified that generalists and normative experts worked with the subject-matter experts to decompose the broad objectives of the elicitation by clearly and precisely specifying more focused and simpler sub-issues. Workshops are held with the generalists, normative, and subject-matter experts to discuss and decompose the broad issues of the elicitation. The project objectives clearly define the goals of the project and are used to focus the group on the specific issues and any sub-issues. This is documented in the workshop and field trip summary sections of the PVHA and WPDEE reports.

### **Step 4 - ASSEMBLY AND DISSEMINATION OF BASIC INFORMATION**

The assembly of background information is conducted by the generalists and normative experts and distributed to the subject-matter experts by the generalist. This information is documented as "References Distributed To Expert Panel Members" Appendix B of the PVHA and WPDEE reports.

### **Step 5 - PRE-ELICITATION TRAINING**

Personnel and document reviews were conducted to assess implementation consistent with pre-elicitation training. The objective evidence reviewed related to the training administered to subject-matter experts, normative, and generalists relative to the PVHA. A document titled, "Elicitation Process" (prepared by Mr. Peter Morris of Applied Decision Analysis, Inc. for Workshop #1, dated Feb. 22, 1995) was available for review. This document contained the

evidence to familiarize attendees with the subject matter and for the elicitation process itself. This document also identified who the normative and generalist experts were for the PVHA elicitation. Identification of the attending subject-matter experts, normative, and generalist experts was available in Appendix C, "Summaries PVHA Workshops" of the PVHA report.

An additional review was conducted of documentation that attested to training of attendees with regard to the WPDEE. The "Workshop on Significant Issues and Available Data" (prepared by Kevin J. Coppersmith of Geomatrix Consultants, Inc., dated March 25 and 26, 1997) was provided to familiarize the subject-matter experts with the elicitation process.

A document titled, "Probability Assessment Workshop" (produced by Bruce R. Judd of Strategic Decisions Group and Peter A. Morris of Applied Decision Analysis, Inc., dated 5/16/95) was reviewed. This document contains direct evidence for completion of training of the subject-matter experts to educate them in uncertainty and probability, providing practice exercises in articulating their judgements and to increase the subject-matter experts knowledge and awareness of possible biases. In addition, a "Probability Assessment Workshop" (produced by Peter A. Morris of Applied Decision Analysis, Inc., dated 6/10/97) document was reviewed for the WPDEE. This document coupled with attendance documentation provided assurance that attendees completed training consistent with the content of the "Probability Assessment Workshop" conducted for the PVHA.

Evidence was provided by the M&O training records personnel in attesting to additional training provided to the generalist in support of the PVHA. This information included indoctrination and training into aspects of the Yucca Mountain Project, Quality Assurance and specific M&O Quality Assurance Procedures. No additional training information was available from the M&O Training Records personnel relative to additional training for the normative expert. This supports the need to procedurally identify the required training for the normative and generalist experts.

It was noted that documentation (which provides direct evidence for the nature of the training completed) regarded as Q records were filed in the M&O records system as a non-Q record. An evaluation of elicitation process records should be conducted in accordance with the definition provided in AP-17.1Q, Revision 0, "Record Source Responsibilities for Inclusionary Records," which cites "mission related" records as "inclusionary." See Recommendation 1.

#### **Step 6 - ELICITATION OF JUDGEMENTS**

The generalists and normative experts are required to be in attendance for the complete session with each subject-matter expert in a private setting conducive to uninterrupted discussion. In discussion with M&O personnel the generalists conduct the subject-matter expert interviews at the Geomatrix Consultants Inc. office located in San Francisco. Peter Morris (Applied Decision Analysis, Inc.) performed the function of the normative expert and attended the interviews with

the subject-matter experts. The elicitation interview process was found to be documented in the PVHA and WPDEE reports.

The normative expert is required to summarize the issues to be covered and outline the logistics of the elicitation at the start of the session for each subject-matter expert. In discussion with M&O personnel, the expert elicitation process is covered during the first workshop and then throughout the other workshops conducted. Also, prior to the elicitation interviews, the normative expert discussed the process of elicitation with the MDT members.

Subject-matter experts were verified to have been queried in a uniform manner and asked to provide specific answers to questions about the issues considered and the reasoning behind their responses. During the expert elicitation interview process, pre-established questions that need to be considered are provided to the subject-matter experts for their review. These questions were documented in Table 2-1 of the PVHA and WPDEE reports reviewed. The reasoning behind their responses were provided through the interview process which were documented in the report.

The responses from the subject-matter experts are documented by Geomatrix Consultants, Inc. personnel by written notes during the expert elicitation interviews. The notes are then transcribed into an "Elicitation Interview Summary." The summary is provided to the subject-matter experts for their review and concurrence. The subject-matter experts may revise their statements or positions during their review.

#### **Step 7 - POST-ELICITATION FEEDBACK**

Each subject-matter expert (or team of subject-matter experts) were provided feedback from the elicitation team on the results of his or her elicitation. The feedback process required the experts to defend/revise their assessments and to provide appropriate documentation during workshops. Discussions and feedback from experts and panel members were provided during workshops. Based on these discussions, the experts revised or clarified their respective judgements/summaries. The resulting elicitation summaries are reflected in the "Elicitation Interview Summaries" section of the PVHA and WPDEE reports.

For elicited judgements, the rationale for any revisions are required to be well documented. However, based on a review of the PVHA and WPDEE reports, only the expert's final summary is documented. The drafts of the expert assessments are maintained as administrative records. Discussion with M&O personnel revealed that the M&O disagrees with NUREG-1563 on this issue. This is documented in a letter from Stephan J. Brocoum to M. J. Bell, dated 08/06/97. The M&O's position is that the subject-matter experts would feel "anchored" by having to provide their rationale for making revisions to their initial assessment. A recommendation was made that the M&O document their justification for not implementing specific NUREG-1563 guidance. See Recommendation 2.

**Step 8 - AGGREGATION OF JUDGEMENTS (INCLUDING TREATMENT OF DISPARATE VIEWS)**

The surveillance team verified that when disparate judgements are aggregated or combined, the rationale for the specific aggregation techniques employed was provided and the documentation was sufficient to trace the impact of the individual expert's judgement on the consolidated judgement. The rationale for aggregated judgements for the reports reviewed identified that equal weighting was used.

There were no disparate opinions that arose during the PVHA and WPDEE. As discussed with M&O personnel, the documentation for the bases of the differing views would be provided in the report, particularly in the results section and the expert's elicitation interview summary.

**Step 9 - DOCUMENTATION**

Documentation of a formal expert elicitation was found to exist for the following:

- a) Resulting judgements along with the reasoning supporting these judgements were documented in the reports reviewed;
- b) Specific issues addressed by the elicitation were defined in the "Project Objectives" section of the strategic/project plans and PVHA and WPDEE reports. Documents reviewed included the Strategic Plan for Probabilistic Volcanic Hazard Analysis Expert Judgement Project, dated 11/94; Project Plan for the Waste Package Degradation Expert Elicitation, dated 08/1997; Project Plan for the Saturated Zone Flow and Transport Expert Elicitation, dated June 5, 1997; and the Project Plan for the Expert Elicitation Project for the Unsaturated-Zone Flow Model, dated December 9, 1996.
- c) There was no specific section identified for any unambiguous definitions. Unambiguous definitions of all specific terms provided and any assumptions used in the elicitation should be explicitly stated. Assumptions were addressed in the WPDEE report, section 3.2. No assumptions were required to be identified in the PVHA report.
- d) Judgements, as they are stated by each subject-matter expert in the PVHA and WPDEE reports reviewed, were accompanied by the logic and information on which they are based.
- e) Calculations that the experts considered important in determining judgements or models used were recorded. Literature used by the experts were documented as Appendix B in the PVHA and WPDEE reports.

f) Documentation clearly distinguished between information provided directly by each subject-matter expert and any subsequent processing of that information, such as smoothing, interpolation, extrapolation, or aggregation of the judgements of different experts. Results of the subject-matter expert's elicitations were well documented through the "Expert Elicitation Interview Summaries." The "Summary of Results (Aggregate)" documented in the PVHA and WPDEE reports were properly detailed separately.

## **DEFICIENCY**

### **DR M&O-97-D-88**

DOE/RW-0333, QARD, Revision 7, Section 5.0, "*Work shall be performed in accordance with controlled implementing documents.*"

The M&O does not have a formal procedure established that delineates the expert elicitation process being conducted. Based on the review of the expert elicitation performed, the process is effective in providing the results of the elicitation activities despite the lack of a procedure in place. However, to provide consistency and continuity, a procedure must be established. The expert elicitation procedure must address, but is not limited to:

- a) The step-by-step process of performing an expert elicitation, such as definition of objectives, selection of experts, refinement of issues and problem composition, etc.;
- b) Training requirements must be established (who requires training and to what level);
- c) Qualifications of personnel must be established (generalists, normative expert, and subject-matter experts);
- d) The use of project plans for the elicitation must be defined including the review and approval requirements;
- e) Documented reviews and resolutions for conflicts of interest for personnel involved with expert elicitation;
- f) Defining what expert elicitation records are designated Q and Non Q in support of the conduct and conclusions of the expert elicitation; and
- g) Content and format of the expert elicitation final report.

## RECOMMENDATIONS

The following are recommendations identified by the surveillance team based on the review of the expert elicitation activities performed by the M&O. No response is required for these recommendations.

1. Review records packages for all completed expert elicitation to determine what Non Q records should be included in the Q records package as required by the new expert elicitation procedure.
2. Document the justification for not implementing selected guidance from NUREG-1563. For example, NUREG-1563, Step 7, "Post-Elicitation Feedback," requires that for all elicited judgements, the rationale for any revisions are well documented. The M&O has not required the experts to document their rationale for changes and has taken exception to this particular guidance.
3. The M&O should proceed with the issuance of their draft expert elicitation procedure as an M&O in-line procedure. The procedure may be issued as an administrative procedure if the M&O decides not to issue the procedure as an in-line M&O procedure.
4. Conduct and document an impact review of previously completed expert elicitations to the QARD (Revision 8, "Draft") and new expert elicitation procedure requirements. This could be performed and documented as part of the DR.
5. M&O QAP-2-0, Revision 4, "Conduct of Activities," should be reviewed for clarification that addresses the criteria for the "Activity Evaluation" form, Step IV. Clarification may be needed for this step to accurately reflect when a procedure is required to be written. A review of the activity evaluations performed for the PVHA and WPDEE indicated that a new or revised procedure was not required. This was marked "no" incorrectly, as there is no procedure in place for the expert elicitation process.

## PERSONNEL CONTACTED

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Thomas E. Rodgers	Technical Evaluation	M&O/Science Engineering Associates
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**DOCUMENTS REVIEWED:**

DOE/RW-0333P, Revision 7, "Quality Assurance Requirements and Description"  
AP-17.1Q, Revision 0, "Record Source Responsibilities for Inclusionary Records"  
NUREG-1563, dated November 1996, "Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program"  
BA0000000-0717-2200-00082, Revision 0, "Probabilistic Volcanic Hazard Analysis for Yucca Mountain, Nevada" (including supporting documentation from the records package)  
"Strategic Plan - Probabilistic Volcanic Hazard Analysis Expert Judgement Project", dated November 1994  
"Final Report Waste Package Degradation Expert Elicitation Project", dated August 15, 1997 (including supporting documentation)  
"Project Plan for the Waste Package Degradation Expert Elicitation", Revision 0  
"Project Plan for the Saturated Zone Flow and Transport Expert Elicitation", Revision 1  
"Project Plan for the Expert Elicitation Project for Unsaturated-Zone Flow Model", Revision 0  
M&O QAP-2-0, Revision 4, "Conduct of Activities"