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**RESPONSE TO U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF
OBSERVATIONS ON THE U.S. DEPARTMENT OF ENERGY (DOE) SPONSORED
"PVHA-U FIELD TRIP: VOLCANIC EVENT DEFINITION AND HISTORY OF
VOLCANISM IN THE YUCCA MOUNTAIN REGION," MAY 1-4, 2006**

Reference: Ltr, Kokajko to Williams, dtd 7/27/06

The reference letter contains comments of the NRC staff related to their observations during a field trip on May 1-4, 2006, that supported the DOE update of the Probabilistic Volcanic Hazard Analysis (PVHA-U). The enclosure to this letter provides additional information relating to NRC staff observations concerning (1) the public availability of information that has been given to the members of the PVHA-U expert panel, (2) adherence to Quality Assurance procedures in the creation, analysis, and reporting of data relating to the PVHA expert elicitation, and (3) consideration of competing interpretations of data.

There are no new regulatory commitments in this letter.

Please direct any questions concerning this letter to J. Russell Dyer at (702) 794-1301 or e-mail russ_dyer@ymp.gov, or Eric T. Smistad at (702) 794-5073 or e-mail eric_smistad@ymp.gov.


Mark H. Williams, Director
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RAO:AVG-1570

Enclosure:
Response to the U.S. Nuclear Regulatory
Commission Staff Comments from the
PVHA-U Field Trip, May 1-4, 2006

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Enclosure

Response to the U.S. Nuclear Regulatory Commission Staff Comments from the PVHA-U Field Trip, May 1-4, 2006

By letter dated July 27, 2006 (Kokajko to Williams)(the "reference letter"), the U.S. Nuclear Regulatory Commission (NRC) Staff provided comments related to their observations during a field trip on May 1-4, 2006 that supported the U.S. Department of Energy (DOE) update of the Probabilistic Volcanic Hazard Analysis (PVHA-U). This enclosure provides additional information relating to NRC Staff observations concerning (1) the public availability of information that has been provided to the members of the PVHA-U expert panel, (2) adherence to Quality Assurance (QA) procedures in the creation, analysis, and reporting of data relating to the PVHA expert elicitation, and (3) consideration of competing interpretations of data.

Public Availability of Information Provided to PVHA Panel Members

The reference letter notes that information related to volcanism in the Yucca Mountain region has been made available to the PVHA-U experts via an FTP site, e-mail, CD-ROM, or hard copy and that when NRC staff members requested access to that information, they were told that the information would become available at some future time. The reference letter indicated that for the NRC Staff and public to fully understand the basis and validity of the reasoning used by various PVHA-U panel members, this information should be publicly available. Further, the reference letter encouraged DOE to make as much of the information as possible publicly available prior to the next PVHA-U public meeting on September 26-27, 2006.

At the recent public PVHA-U workshop, DOE made available copies of an updated reference list. This reference list identifies the published references and approved Yucca Mountain Project (Project) documents that have been made available to the PVHA-U experts. Some information provided to the expert panel has been developed in response to specific requests from individual PVHA-U experts. Some of this work product information is currently considered by the Project to be preliminary and has not been publicly released; however, it is the intent of the Project to make publicly available the information and reference lists supplied to and utilized by the PVHA-U expert panel either in the applicable analysis and model report (AMR) or in the final PVHA-U report.

Adherence to Quality Assurance Procedures in the Creation, Analysis, and Reporting of Data Relating to the PVHA Expert Elicitation

The reference letter indicates that, in the view of NRC Staff, expert elicitation panel members are free to use any data they believe are useful to come to their own conclusions. The reference letter suggests that DOE should ensure that panel members and the public receive accurate data. Further, the reference letter indicates that when panel members request information generated by the Project, NRC Staff expects that applicable QA procedures will have been followed in the creation, analysis and reporting of the data. The reference letter acknowledges that when panel members request data that was generated outside the Project, it may not be possible for DOE to ensure that proper procedures were followed in the generation of the data.

In general, data and information provided to the PVHA-U expert panel by the Project consist of the following: (1) data that were created or collected under the Project's QA procedures; (2) illustrations or depictions that were based on data that were created or collected under the Project's QA procedures, and if utilized by the PVHA-U expert panel, the Project would ensure that the data is or will be qualified; and (3) data that were gathered from sources outside the Project (and thus not subject to the Project's QA procedures) that is deemed reliable for purposes of an expert elicitation (e.g., articles appearing in scholarly scientific journals). DOE agrees that it should ensure that expert panel members and the public receive accurate data, and it believes that it is conducting the PVHA-U expert elicitation in a manner that is consistent with NUREG-1563 (*Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program*) (Kotra 1996). In addition to information provided by the Project, the PVHA-U experts may use information based on their professional experience and expertise.

All applicable Project QA procedures will be followed in the creation, analysis, and final reporting of Project data. The *Technical Work Plan for: Igneous Activity Assessment for Disruptive Events* (BSC 2006, Section 8.1, bullets 2 and 3) indicates that the final compilation and documentation of the elicitation process are subject to the requirements of the *Quality Assurance Requirements Document* (DOE 2006) and that these activities are to be conducted under the process controlled by the Project guidance for conducting an expert elicitation, PA-PRO-0202 (BSC 2005). In their elicitation summaries, the PVHA-U experts will document the data sources used in developing their assessments, including the information provided by the Project and information based on their professional experience. The Project intends to include these summaries in the PVHA-U final report, scheduled for completion at the end of calendar year 2008.

Consideration of Competing Interpretations of Data

The reference letter notes that, in the context of expert elicitations, there may exist more than one legitimate interpretation of certain data or phenomena. NRC Staff expressed a concern that most of the data discussed during a prior PVHA-U public meeting was generated by DOE and its contractors, who served as proponents of that work, and that no proponents of opposing views appeared to have been identified for certain topics. NRC Staff recognized that DOE may not be able to provide proponents for every perspective, but suggested that DOE encourage the expert panel members to assume the role of proponent of competing interpretations and to include in their report the effect of these interpretations on the outcome. Specifically, the NRC Staff noted that in a prior PVHA-U public meeting, the expert panel received no presentation that considered how conventional dike propagation theory would account for observations in the Yucca Mountain region.

Neither NUREG-1563, nor the Project's procedures, make a distinction between "proponent experts" and "evaluator experts." These terms and roles are described in the Senior Seismic Hazard Analysis Committee (SSHAC) guidance (NUREG/CR-6372; Budnitz et al. 1997, Section 3.3.2) and have been considered as useful for the PVHA-U. A proponent expert is one who interprets data and advocates that interpretation. An evaluator expert, which is the role expected of the PVHA-U experts, is one who considers possible alternative interpretations of data and, most importantly, is responsible for quantifying the uncertainties in his/her evaluation, which necessarily involves the assessment of alternative interpretations of data.

In response to a request from the expert panel, Project geologists developed data and information related to igneous event definition at analog sites throughout the Yucca Mountain region. Some of that information is purely data (e.g., dimensions, ages, maps showing outcrop patterns) and some is interpretation (e.g., exhumation depths, number of dikes and relation to volcanic centers). To alert the expert panel to the fact that the analogue information contains interpretations as well as data, the introductory discussions prior to the field trip properly identified the Project speakers as "proponents."

From the beginning of the PVHA-U and throughout the process, alternative viewpoints and interpretations have been solicited from the expert panel members and other Project specialists. Proponent experts from both U.S. and international institutions have provided their views to the expert panel, especially during Workshop 2 (February 15-18, 2005) on alternative models. The Project believes that the use of proponent experts with differing viewpoints during the PVHA-U process, including discussions on alternative models in connection with Workshop 2, demonstrates that the expert panel has considered competing interpretations of data. The PVHA-U experts, as evaluators, need to consider—not necessarily agree with—these viewpoints in their assessments.

With regard to the NRC Staff's specific comment about consideration of dike length, the expert panel had extended discussion on this topic during Workshop 2 and during the field trip on May 1-4, 2006. Most of the expert panel members were also involved in discussions on this subject during the PVHA in 1996 (CRWMS M&O 1996), so they are aware of the importance of dike length in their assessments. Also, discussions at Workshop 3 on September 26-27, 2006, Preliminary Interpretations, focused on dike length, as well as other event characteristics. As suggested by the NRC Staff, efforts were made during the discussions at the workshop to ensure that a wide range of potential proponent views were considered and debated by the panel. The PVHA-U experts are well-prepared to evaluate the information provided by the Project on dike length, as well as the larger body of information on that subject available by virtue of the PVHA-U expert panel's collective knowledge and experience.

List of References Cited in Response

BSC (Bechtel SAIC Company, LLC) 2005. Expert Elicitation, PA-PRO-0202, Rev. 0. Las Vegas, Nevada. October 3, 2005.

BSC (Bechtel SAIC Company, LLC) 2006. Technical Work Plan for: Igneous Activity Assessment for Disruptive Events (TWP-WIS-MD-000007), Rev 09, ICN 01. Las Vegas, Nevada. August 10, 2006.

CRWMS M&O 1996. *Probabilistic Volcanic Hazard Analysis for Yucca Mountain, Nevada*. BA0000000-01717-2200-00082 REV 0. Las Vegas, Nevada: CRWMS M&O.

DOE (U.S. Department of Energy) 2006. *Quality Assurance Requirements and Description*. DOE/RW-0333P, Rev. 17. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management.

Kotra, J.P.; Lee, M.P.; Eisenberg, N.A.; and DeWispelare, A.R. 1996. *Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program*. NUREG-1563. Washington, D.C.: U.S. Nuclear Regulatory Commission.

NRC (U.S. Nuclear Regulatory Commission) 2006. U.S. Nuclear Regulatory Commission Staff Observations on the U.S. Department of Energy Sponsored "PVHA-U Field Trip: Volcanic Event Definition and History of Volcanism in the Yucca Mountain Region," May 1-4, 2006. Washington, D.C. July 27, 2006. CCU.20060808.0006.