

August 20, 2002

Joseph D. Ziegler, Acting Assistant Manager
Office of Licensing and Regulatory Compliance
U.S. Department of Energy
Yucca Mountain Site Characterization Office
P.O. Box 364629
North Las Vegas, NV 89036-8629

SUBJECT: IGNEOUS ACTIVITY AGREEMENT 2.16

Dear Mr. Ziegler:

During a Technical Exchange and Management Meeting held on June 21-22, 2001, the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE) reached agreement on a number of issues within the Igneous Activity (IA) Key Technical Issue (KTI). By letter dated July 1, 2002, DOE provided a report entitled, "Climate Change Effects on Disruptive Event Biosphere Dose Conversion Factors," to address IA Agreement 2.16. The NRC staff has reviewed this information, with respect to the agreement, and the results of the staff's review are enclosed.

Based on its review of the letter report and other available information, the NRC staff considers that the information contained in the letter report satisfies the intent of IA Agreement 2.16. In the letter report, DOE states that the volcanic release biosphere dose conversion factors (BDCFs) used for the present climate are conservative if applied to a future wetter climate. Although the NRC staff is not convinced that neglecting the effects of climate change on BDCFs used for volcanic disruption scenarios is necessarily conservative, 10 CFR Part 63 does not require conservative analyses. The regulations do require that DOE consider those processes that have a significant effect on risk, and based on the information DOE provided, the NRC staff considers that the methodology DOE used does appropriately consider risk in the resulting performance assessment calculations. Therefore, the NRC staff considers DOE's approach acceptable. Based on the above, IA Agreement 2.16 is complete. If there are any questions regarding this letter, please contact John S. Trapp at 301-415-8063 or by e-mail at jst@nrc.gov.

Sincerely,
/RA/

Janet R. Schlueter, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Attachment: NRC Review of DOE Letter Pertaining to Igneous
Activity Agreement 2.16

cc: See attached distribution list

Letter to J. Ziegler from J. Schlueter dated August 20, 2002

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A. Bacock, Big Pine Paiute Tribe of
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R. Quintero, Inter-Tribal Council of Nevada
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M. Bengochia, Bishop Paiute Indian Tribe

J. Egan, Egan & Associates, PLLC

J. Leeds, Las Vegas Indian Center

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R. Joseph, Lone Pine Paiute-Shoshone Tribe

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D. Crawford, Inter-Tribal Council of Nevada

H. Blackeye, Jr., Duckwater Shoshone Tribe

D. Eddy, Jr. Colorado River Indian Tribes

G. Runkle, DOE, Washington, DC

W. Briggs, Ross, Dixon & Bell

H. Jackson, Public Citizen

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NRC Review of DOE Letter Pertaining to Igneous Activity Agreement 2.16

The U.S. Nuclear Regulatory Commission (NRC) goal of issue resolution during this interim pre-licensing period is to assure that the U.S. Department of Energy (DOE) has assembled enough information on a given issue for NRC to accept a license application for review. Resolution by the NRC staff during pre-licensing does not prevent anyone from raising any issue for NRC consideration during the licensing proceedings. Also, and just as important, resolution by the NRC staff during pre-licensing does not prejudge what the NRC staff evaluation of that issue will be after its licensing review. Issues are resolved by the NRC staff during pre-licensing when the staff has no further questions or comments about how DOE is addressing an issue. Pertinent new information could raise new questions or comments on a previously resolved issue.

This enclosure addresses one NRC/DOE agreement made during the Igneous Activity (IA) Technical Exchange and Management Meeting (see NRC letter dated June 29, 2001, which summarized the meeting) on June 21-22, 2001. By letter dated July 1, 2002, DOE submitted information to address IA Agreement 2.16. The information submitted for this agreement is discussed below.

1) Igneous Activity Agreement 2.16

Document that neglecting the effects of climate change on the disruptive event BDCF's [Biosphere Dose Conversion Factors] is conservative. DOE will document that neglecting the effect of climate change on disruptive event BDCF's is conservative in a subsequent revision to the AMR Input Parameter Values for External and Inhalation Radiation Exposure Analysis (ANL-MGR-MD-000001) and Disruptive Event Biosphere Dose conversion Factor Analysis (ANL-MGR-MD-000003) or equivalent document.

NRC Review: The NRC staff has reviewed the letter report entitled "Climate Change Effects on Disruptive Event Biosphere Dose Conversion Factors," dated July 1, 2002, and considers that the information contained in the letter report satisfies the intent of IA Agreement 2.16. In the letter report, DOE states that the volcanic release BDCFs used for the present climate are conservative if applied to a future wetter climate. Although the NRC staff is not convinced that neglecting the effects of climate change on BDCFs used for volcanic disruption scenarios is necessarily conservative, 10 CFR Part 63 does not require conservative analyses. The regulations do require that DOE consider those processes that have a significant effect on risk, and based on the information DOE provided, the NRC staff considers that the methodology DOE used does appropriately consider risk in the resulting performance assessment calculations. Therefore, the NRC staff considers DOE's approach acceptable.

BDCFs are used in performance calculations to convert a radionuclide concentration into units of annual radiological dose. The NRC staff asked DOE to provide documentation supporting the stated conservatism in neglecting the possible effects of climate change on volcanic scenario BDCFs.

Neglecting the effects of climate change on volcanic BDCFs may not be appreciably conservative, as indicated in CRWMS M&O (2001b). The NRC staff note that basaltic tephra fall deposits at the Cerro Negro volcano in Nicaragua received over 4 m [13 ft] of rainfall between 1995–1999 (Hill et al., 2001). Airborne particle concentrations measured over these deposits, ranged from approximately 10^{-4} g/m³ for static deposits to approximately 10^{-2} g/m³ for

heavy surface disturbance(Hill et al., 2001). In comparison, DOE used a range of approximately 10^{-4} g/m³ to 10^{-3} g/m³ in volcanism performance calculations (CRWMS M&O, 2000a,b). Average annual rainfall in the dose receptor location, however, was only approximately 0.1 m/yr (CRWMS M&O, 2000c). The Cerro Negro data show that airborne particle concentrations measured in climates ten times wetter than current Amargosa Valley conditions may not be appreciably lower than those used by DOE in volcanism performance calculations. Thus, neglecting the apparently minor effects of climate change does not necessarily create an appreciable degree of conservatism in DOE airborne particle concentrations.

Inhalation of contaminated airborne particles is the dominant dose pathway for the volcanic disruption scenario (CRWMS M&O, 2001b). Future climates used in DOE performance calculations are wetter than the present-day climate (e.g., CRWMS M&O, 2000a). As discussed in the letter report, an increase in the frequency, intensity, or duration of precipitation will result in multiple processes that may reduce the concentration of airborne particles. The NRC staff agree with this assessment and can find no credible basis to indicate that airborne particle concentrations would increase in periods of wetter climate, relative to drier climates. While the staff does not agree that the methodology being used by DOE is necessarily conservative, 10 CFR Part 63 does not require conservative analyses. The regulations do require that DOE consider those processes that have a significant effect on risk, and based on the information DOE provided, the NRC staff considers that the methodology DOE used does appropriately consider risk and, therefore, is considered acceptable.

Additional Information Needed: None at this time.

Status of Agreement: Igneous Activity Agreement 2.16 is complete.

References:

CRWMS M&O. "Total System Performance Assessment–Site Recommendation." TDR–WIS–PA–000001. Revision 00 ICN1. North Las Vegas, Nevada: TRW Environmental Safety Systems, Inc. 2000a.

———. "Input Parameter Values for External and Inhalation Radiation Exposure Analyses." ANL–MGR–MD–000001. Rev. 01 ICN 00. North Las Vegas, Nevada: DOE, Yucca Mountain Site Characterization Office. 2000b.

———. "Evaluate Soil/Radionuclide Removal by Erosion and Leaching." ANL–NBS–MD–000009. Rev. 00. North Las Vegas, Nevada: DOE, Yucca Mountain Site Characterization Office. 2000c.

———. "Nominal Performance Biosphere Dose Conversion Factor Analysis." ANL–MGR–MD–000009. Rev. 01. North Las Vegas, Nevada: DOE, Yucca Mountain Site Characterization Office. 2001a.

———. "Disruptive Event Biosphere Dose Conversion Factor Analysis." ANL–MGR–MD–000003. Rev. 01. North Las Vegas, Nevada: DOE, Yucca Mountain Site Characterization Office. 2001b.

Hill, B.E., C.B. Connor, J. Weldy, and N. Franklin. "Methods for Quantifying Hazards from Basaltic Tephra-Fall Eruptions." C. Stewart, ed. *Proceedings of the Cities on Volcanoes 2 Conference, Auckland, New Zealand, 12–14 February 2001*. Institute of Geological and Nuclear Sciences Information Series 49. Lower Hutt, New Zealand: Institute of Geological and Nuclear Sciences Limited. p. 50. 2001.