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Office of Civilian Radioactive Waste Management
Yucca Mountain Site Characterization Office
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OCT 0 8 1997

OVERNIGHT MAIL

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U.S. DEPARTMENT OF ENERGY (DOE) RESPONSE TO U.S. NUCLEAR REGULATORY COMMISSION (NRC) ISSUE RESOLUTION STATUS REPORT ON METHODS TO EVALUATE CLIMATE CHANGE AND ASSOCIATED EFFECTS AT YUCCA MOUNTAIN, NEVADA, (KEY TECHNICAL ISSUE: UNSATURATED AND SATURATED FLOW UNDER ISOTHERMAL CONDITIONS)

Reference: Ltr, Stablein to Brocoum, dtd 6/30/97

We have reviewed your Issue Resolution Status Report (IRSR) on "Methods to Evaluate Climate Change and Associated Effects." This report is the first IRSR produced from the new process between DOE and NRC. Sections within this report document: the IRSR scope and the Key Technical Issue (KTI) subissue agreed upon between DOE and NRC; the importance of this KTI subissue to repository performance; the review methods used and the acceptance criteria; and the status of any items considered open by the NRC. As agreed between DOE and NRC, the climate methodology used for providing future climate variability was chosen as the test case for the new Issue Resolution Process.

From an overall climate perspective, we understand you have reviewed DOE's methodology in assessing future climate variability and its associated effects, and you have no open items at this time.

It is DOE's plan to continue with our current methodology in providing products defining possible future climate variability; to develop a plan for identifying and qualifying existing data as appropriate to support the License Application; and to ensure possible future climate scenarios are defendable, fully citable, and documented.

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From an overall regulatory perspective, we understand this report also provides the framework for future IRSRs on the subissues making up the KTIs. It is clear that NRC staff reviewed available research from both DOE-Yucca Mountain Site Characterization Project activities, as well as those performed outside the program. DOE finds the acceptance criteria, intended for use in NRC staff review, to be an important aspect of this IRSR. Sufficient detail is provided to facilitate DOE preparing licensing documents. DOE encourages the NRC to continue to provide acceptance criteria at a similar level of detail in subsequent IRSRs.

Specific comments are enclosed. If you have any questions, please contact Sheryl A. Morris at (702) 794-5487 or April V. Gil at (702) 794-5578.

Stephan J. Brocoum
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AML:SAM-2219

Enclosure:
DOE Clarification on NRC Assessments

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ENCLOSURE

DOE Clarifications On NRC Assessments

NUMERIC MODELING ACTIVITIES

Ltr Comment #1: *The staff is aware that DOE is supporting climate modeling studies. Although those studies can provide additional information, staff will not require climate modeling to estimate the range of future climates at Yucca Mountain. Paleoclimate data, along with insights gained from previous climate modeling, can be used to estimate conditions during past pluvial climates that produced cooler and wetter conditions at Yucca Mountain.*

Rpt Comment #1: *The staff will not require climate modeling to estimate the range of future climates. If DOE uses numerical climate models, determine whether such models were calibrated with paleoclimate data before they were used for projection of future climate, and that their use suitably simulates the historical record.*

DOE has completed all planned numerical modeling activities using National Center for Atmospheric Research's GENESIS nested model. Specifically, four model runs were produced: two calibration runs, and two runs to simulate the anthropogenic effects.

Initially, this model was calibrated by comparing present day meteorological data with a present day run. However, the second run, simulating the global patterns of 21,000 years ago was not fully calibrated using paleoclimate data; Yucca Mountain specific data sets were not complete. The model present day output seemed to be similar to meteorological data sets. Activities continued and DOE ran two model runs to simulate possible future anthropogenic effects unavailable through the paleoclimate records. These two numerical scenarios simulated today's environment with the CO^2 levels doubled; and with the CO^2 levels being six times those of today.

As Yucca Mountain paleoclimate reconstructions have become more available, we now see the model output for 21,000 years ago shows temperatures are approximately 5°C too warm in winter, 3°C too warm in summer, and precipitation amounts about 7 inches too low using 150mm/y as an annual precipitation amount. Our plan is to adjust these anthropogenic scenario outputs while merging these scenarios with paleoclimate records to develop future climate variability scenario products.

METHODOLOGY ASSESSMENTS

Ltr Comment #2: *.....enough relevant information exists to reach early resolution at the staff level on methods to assess climate variability and related topics.*

We understand the methodology has been assessed; we will continue to develop and provide the

interpretation of this relevant information to support TSPA and biosphere products.

FUTURE CLIMATE VARIABILITY PRODUCTS

Rpt Comment #2: *Climate projections based primarily on paleoclimate data are acceptable for use in performance assessments of the Yucca Mountain site.*
Rpt Comment #3: *DOE's projections of long-term climate change are acceptable if these projected changes are consistent with evidence from the paleoclimate data. Specifically, staff should determine whether DOE has evaluated long-term change based on known patterns of climatic cycles during the Quaternary, especially the last 500kyrs.*

DOE agrees; climate projections should be primarily based on paleoclimate data. Our plan for long-term projections is based on known cycles of glacial/interglacial climates during the Quaternary, focusing on the last 500kyrs.

DEFENDABILITY

Ltr Comment #3: *It is necessary that appropriate data and analyses will be fully qualified before NRC's receipt of a DOE license application.*

Rpt Comment #4: *Values for climatic parameters (time (s) of onset of climate change; mean annual precipitation (MAP); mean annual temperature (MAT);etc) to be used in DOE's safety case must be adequately justified.*

Plans for 1998 include an evaluation of data sets and the development of a data qualification plan for those data sets which are key, but not qualified. It is our intention to ensure the variability products can be justified and are defendable.