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TO: Commissioner Robert A. Laurie
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FROM: Barbara L. Evoy, Chief
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DATE:

**SUBJECT: REVIEW OF THE YUCCA MOUNTAIN PRELIMINARY SITE SUITABILITY
EVALUATION FOR THE PROPOSED RADIOACTIVE WASTE
REPOSITORY, NEVADA**

We appreciate the opportunity to review the July 2001 Yucca Mountain Preliminary Site Suitability Evaluation (PSSE) for the proposed Radioactive Waste Repository in Nevada. Our review and comments focused primarily on Section 3 (Preliminary Postclosure Suitability Evaluation), specifically chapters: 3.3.1 (Site Characteristics), 3.3.2 (Unsaturated Zone Flow Characteristics), 3.3.7 (Unsaturated Zone Flow and Transport Characteristics), and 3.3.8 (Saturated Zone Flow and Transport Characteristics). We have also reviewed Section 12 (Radionuclide Transport in the Saturated Zone) of the Supplemental Science and Performance Analyses: Vol. 1, Scientific Bases and Analyses, Bechtel SAIC Company, 2001b (SSPA). This document is referenced in the PSSE, and summarizes the latest results of hydrogeologic evaluation conducted by the Nye County, known as the Early Warning Drilling Program. These documents provide information regarding the suitability of the Yucca Mountain site as a nuclear waste repository; describe site and regional hydrogeologic conditions; and summarize results of flow and transport modeling, sensitivity studies, and potential environmental impact to the site and areas down-gradient of the site, specifically Amargosa and Death Valleys.

Yucca Mountain Preliminary Site Suitability Evaluation

The report evaluates the Yucca Mountain site as a potential nuclear waste repository, based on proposed site suitability guidelines (10 CFR Part 963). The criteria and methodology of

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evaluation are structured to be consistent with both the licensing regulations proposed by the U.S. Nuclear Regulatory Commission (NRC) and the radiation protection standards issued by the U.S. Environmental Protection Agency (EPA), to be implemented by the NRC. According to the report, a hypothetical receptor located approximately 18 km from the potential repository site (point of compliance) will not be exposed to an annual radiation dose above 15 mrem (regulatory limits), and radioactivity in groundwater will not exceed 5pC/L (radium), 15 pC/L (gross alpha) or 4 mrem/year (combined beta- and photon-emitting radionuclides).

The PSSE indicates that some of the earlier comments by different California agencies have been addressed. An additional monitoring well in the carbonate aquifer was completed, numerous monitoring wells in the alluvial aquifer were completed, and pumping tests were conducted within the alluvial aquifer down-gradient and up-gradient of the site. The new data resulted in significant changes to the conceptual hydrological model of the Yucca Mountain site.

The most important findings are:

- Confirmation that the piezometric head in the carbonate aquifer is above the water table in the volcanic aquifer and any discharge is not likely to move downward.
- The previously reported steep hydraulic gradient, north of the Yucca Mountain site, was not in the volcanic aquifer but in the perched water above that was erroneously connected to the volcanic aquifer.
- The water table in the alluvium is higher than previously thought (30-70 meters below ground surface). This precludes any significant rising of the water table there and under the Yucca Mountain site.

These are a few examples of how important information was acquired by extending the hydrogeologic evaluation beyond the proposed repository site.

Also, the PSSE gives two different locations for "Devils Hole" relative to the Yucca Mountain site. On page 3-31 it is described as 50 km southeast of Yucca Mt. and on page 3-122 it is described as 90 km south of Yucca Mt. This should be corrected, or explained if there are two Devils Holes in the area.

Conclusions

To adequately represent the hydrologic conditions of the Yucca Mountain flow and transport model, the hydrogeological evaluation of the site should continue to address or improve the following:

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- Better evaluation of the relationship between the perched water and the volcanic aquifer north of the site. This is essential for adequate determination of the model boundary conditions. One monitoring well (USW WT-24) is not sufficient to determine water level for the up-gradient model boundary.
- More accurate determination of transient zone between the volcanic and alluvial systems (this will affect calculation of flow-time and concentration of radionuclides released from the repository).
- Decrease of uncertainty with regard to groundwater flow beneath the site. The flow and transport model is reportedly very sensitive to this factor.
- Coordination of efforts with the United States Geological Survey (USGS) regional modeling that encompasses the area from south of Yucca Mountain to Death Valley. Integrate both models if possible.
- Determination if groundwater flowing under Yucca Mountain discharges into Death Valley, Alkali Flat (Franklin Lake Playa), or Ash Meadows.
- Ascertaining whether the carbonate and volcanic groundwater systems are independent. More specifically, the hydrogeologic characterization of the carbonate aquifer in the vicinity of Yucca Mountain needs more attention. The characterization, based on data from two wells, is not sufficient to provide reliable interpretation of basic hydrogeologic parameters such as hydraulic gradient and groundwater flow direction.

The current computer model attempts to predict the fate and transport of radionuclides 10,000 years into the future. This model should be periodically improved and re-calibrated as new information becomes available, because the model is the main tool supporting suitability of the site with regard to human exposure and groundwater radioactivity at the point of compliance.

Again, thank you for the opportunity to review the PSSE for the proposed Yucca Mountain Radioactive Waste Repository. If you have any questions regarding these comments, please contact Jan Stepek at (916) 341-5777 or via email at stepekj@cwpswrcb.ca.gov .

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