October 19, 2001

Mr. Robert G. Card
Under Secretary
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

**Re: Possible Site Recommendation for Yucca Mountain**

Dear Under Secretary Card:

Over the past 15 years, California has participated in the U.S. Department of Energy's (DOE) proceedings on the Yucca Mountain Project and has provided comments on major technical supporting documents. However, to date, DOE has failed to respond to the majority of these requests and to address California's concerns, either through undertaking the recommended scientific studies regarding potential groundwater impacts or providing the necessary analyses of the potential impacts of transporting spent fuel in California to the proposed repository. As a result, serious inadequacies remain in the federal evaluation of the suitability of the Yucca Mountain site.

There are major potential impacts in California from the proposed repository that must be addressed before a final determination can be made on the suitability of the Yucca Mountain site. In our previous comments, we have recommended that certain scientific studies and analyses be undertaken to evaluate these potential impacts, in particular, transportation and groundwater impacts in California. Until DOE has provided these necessary scientific analyses that address critical areas of public health and safety and environmental impacts, there is insufficient information upon which to make a final determination on the suitability of the proposed Yucca Mountain site.

Enclosed are additional comments by the State of California on the Yucca Mountain Preliminary Site Suitability Evaluation (PSSE) regarding the suitability of Yucca Mountain as a geologic repository (Attachments 1 and 2).

Sincerely,

ROBERT A. LAURIE
Commissioner and State Liaison Officer to the
Nuclear Regulatory Commission

Enclosures: 2

Cc: Carol Hanlon, DOE, Yucca Mountain Site Characterization Office
Governor Gray Davis
The Honorable Mary Nichols
Senator Dianne Feinstein
Senator Barbara Boxer

**COMMENTS BY THE STATE OF CALIFORNIA ON**
**THE POSSIBLE SITE RECOMMENDATION FOR YUCCA MOUNTAIN**

October 19, 2001

## Summary

There is insufficient analyses and information upon which to base a decision on the suitability of the Yucca Mountain Site for a high-level waste repository. Until the Department of Energy (DOE) provides the necessary analyses on potential groundwater and potential transportation impacts in California, DOE lacks the necessary legal and technical basis upon which to make a preliminary suitability determination on this site.

## Need for Addressing States' Concerns

Since 1985, California has provided comments on various proceedings and documents for the proposed Yucca Mountain Project, including comments and testimony on the Draft EIS as well as the public scoping meetings held in 1985. Thirteen California agencies participated in the review of the Draft EIS. Our written comments were prepared through a cooperative interagency effort, coordinated by the California Energy Commission, including participation by the California Departments of Conservation, Emergency Services, Energy Commission, Fish and Game, Health Services, Highway Patrol, Parks and Recreation, Public Utilities Commission, Toxic Substances Control, Transportation, Water Resources Control Board, Water Resources, and the Lahontan Regional Water Quality Control Board. However, despite good faith efforts by these agencies to identify issues of concern to California, DOE has not responded to the large majority of these concerns and requests for additional analyses. As of today, DOE has made little or no progress in addressing the issues and priorities voiced by California and other western states, in particular, to develop a meaningful analysis of the potential transportation impacts from the proposed repository. The analyses and information provided in support of the Yucca Mountain project fail to provide the legal and scientific foundation to support a recommendation by the Secretary of Energy to the President that Yucca Mountain is a suitable site for the proposed geologic repository for the permanent disposal of the nation's spent nuclear fuel and high-level radioactive waste.

A complete and adequate EIS must present a comprehensive review of the proposal upon which well-informed decisions can be made. The whole of a proposed action must be considered in any proposed project. Piece-mealing a project into smaller parts has the effect of avoiding full disclosure of the environmental impacts and nullifies public involvement. To date, DOE has not provided full disclosure of the potential impacts in California from the proposed project, since it has not adequately analyzed potential transportation and potential groundwater impacts in California.

DOE has not adequately considered the project alternatives. The only alternatives examined by DOE have been two variations of the "no action" scenario: (1) the waste should remain in dry storage at the present sites for 10,000 years with "institutional controls" for the full 10,000 years (extremely costly) or (2) institutional controls for just 100 years, after which there would be no controls assumed to protect health and safety (unacceptable, because of disastrous potential consequences from radionuclide leakage into the environment). Neither of these are realistic alternatives.

There has been inadequate public notice of hearings. By failing to identify the preferred mix of shipment mode (rail vs. truck) or to identify rail and truck routes in California and the potentially impacted communities, these impacted communities have no means of evaluating the relevance of the proposed action.

**Need for Additional Transportation Analyses**

DOE has failed to carry out its promise made in 1986 that it would conduct comprehensive assessments of potential shipment routes to be used in transporting spent fuel and high level radioactive waste to a potential repository. DOE stated that, "Route-specific analyses and an evaluation of the impacts on host States and States along transportation corridors will be included in the environmental impact statement." California and other states have requested that the EIS provide route-specific analyses and a careful evaluation of the impacts on states along shipment corridors. DOE has not provided route-specific analyses and, therefore, has not provided a meaningful evaluation of the impact on states along transportation corridors or mitigating measures. Instead, DOE simply stated in the Draft EIS that route selection for shipments would comply with applicable federal regulations.

In our comments on the Draft EIS, we noted that if a Draft EIS is "so inadequate as to preclude meaningful analysis", DOE must "prepare and circulate a revised draft of the appropriate portion." We continue to believe that transportation issues, including the routes, logistics and risks, are so significant that they merit a separate Draft EIS. However, DOE has yet to provide this needed analysis or to provide a comprehensive transportation plan, as requested. In the May 2001, Supplement to the Draft EIS, DOE said, "DOE will address all aspects of the Proposed Action, such as the transportation of spent nuclear fuel and high-level radioactive waste and the No-Action Alternative, in the Final EIS" (SEIA, 1-3). It is our understanding that this Final EIS will be issued with the Site Recommendation to the President. As a result, the public will have no opportunity to review and comment on the promised transportation analysis in the Final EIS before the Secretary submits his recommendation to the President. Moreover, the Secretary will not have the benefits of the comments from corridor states and the public on transportation impacts prior to making a recommendation to the President.

Transportation impacts from the proposed Yucca Mountain Project are the major component of the project that will affect the most people across the US, since the shipments will travel cross-country on the nation's highways and railways. The Proposed Action involves transporting 70,000 metric tons of radioactive waste from 77 individual sites to the repository. DOE has noted that the safety record for the transportation of spent nuclear fuel has been relatively good. However, the numbers of shipments planned for the Yucca Mountain Project would be unprecedented and would be several orders of magnitude greater than the numbers of shipments that have been transported in the past. Total annual shipments of these wastes are projected to increase within the next decade from the current 15 to 25 rail shipments per year nationwide to Yucca Mountain to between 400 to 600 shipments per year. The State of Nevada estimates that the potential number of truck shipments to Yucca Mountain through California is about 74,000 truck shipments of which about three-fourths could traverse southern California under DOE's mostly truck scenario.

Because of California's proximity to Nevada, coupled with the desire to avoid shipments over Hoover Dam and through Las Vegas, DOE may transport a significant portion of these shipments from eastern states through California into Nevada. The number of shipments through California could average five truck shipments every day for 39 years. Under a "mixed truck and rail scenario", California could have an average of two truck shipments per day and 4-5 rail shipments per week for 39 years. Under a "best case" scenario assuming larger rail shipping containers and therefore fewer shipments, California could have more than 26,000 truck shipments and 9,800 rail shipments through our state over this period. Likely routes in California would impact Sacramento, Los Angeles, San Luis Obispo, Santa Barbara, San Bernardino, Fresno, Bakersfield, Barstow and smaller communities. These communities and others along major shipment corridors need to know the extent to which they will be impacted by these shipments, and those communities need to receive adequate resources, equipment, and training to provide for the uneventful transport of these materials.

DOE has not responded to longstanding western states' priorities and public officials' requests to develop a comprehensive transportation program for shipments to the proposed repository. Since 1985, California

and other Western States acting through the Western Governors' Association (WGA) and Western Interstate Energy Board (WIEB) have repeatedly urged DOE to develop a comprehensive transportation program and analysis for spent fuel shipments to the repository. This program would include: (1) full-scale shipping cask testing, (2) mode and route analysis, (3) implementation of a program to provide financial and technical assistance to states and tribes under Section 180 (c) of the NWPA, (4) recognition of the potential negative impact from privatizing key transportation public policy decision-making responsibilities, (5) using the WIPP program as a model in radioactive waste transportation planning, and (6) an assessment of terrorism risks and concerns. In addition, Western Governors adopted a policy resolution in 1999 (WGA Resolution 99-014) calling for DOE to develop a comprehensive transportation program for these shipments and develop adequate criteria and methods for selecting routes and evaluating shipment modes. In spite of these repeated requests, DOE's progress in all of these areas, as reflected in documents in support of the Yucca Mountain Project, has been slow. DOE has, for the most part, not responded to states' requests and concerns. DOE has yet to provide an adequate analysis of the transportation risks and has not provided sufficient detail to evaluate potential impacts. For example, there is no description of the transportation of spent fuel through California, no identification of routes and transport modes, no evaluation of route-specific populations and environmental consequences, and no mitigation proposals offered for these impacts.

Events since 1984, especially the increasing lethality of terrorist attacks in the US, such as the attacks on the World Trade Center and Pentagon and the bombing in Oklahoma City, support the need for a new, more comprehensive assessment of the risk of terrorist attacks and sabotage against repository shipments. We may now assume that a terrorist's objective may be solely to breach the integrity of the cask and release radiation wherever it can be done, rather than, for example, to hijack a shipment. Changes in spent nuclear fuel shipping cask designs and the capabilities of terrorists to attack and destroy targets, make it essential that these risks to spent fuel shipments be reevaluated. DOE should reexamine the risk of terrorism and sabotage against spent fuel and high-level waste shipments to determine the adequacy of the current physical protection requirements under 10 CFR 73 and reevaluate potential risks to the public from shipments to the repository. This analysis must be part of the environmental impact statement.

**California's Routing Concerns**

California transportation agencies have expressed their concern over the possibility that DOE may decide to route through California a major portion of the shipments to Yucca Mountain repository using roads not designed for heavy truck traffic that are extremely remote from emergency response personnel. This concern was heightened by DOE's recent decision to reroute through southern California thousands of low-level radioactive waste shipments from eastern states to the Nevada Test Site. The route selected through California is a longer, less direct route than alternative routes, that then backtracks into Nevada. The route in question originated as a wagon train road to Death Valley and was not engineered for heavy truck traffic. During certain times of the year, this route is the primary access route and evacuation route for the approximately 1.25 million visitors annually to the Death Valley National Park. The lack of emergency response capability along possible routes in California for these shipments and the isolated nature and current configuration of some of these roadways would make compliance with 180(c) requirements extremely costly to complete. DOE has not provided estimates of the resources needed to meet its obligations under 180 (c). DOE must identify the roadways and emergency response improvements and associated costs necessary to protect the public and resources along shipment corridors.

In 1998, the majority of states wrote in a consensus letter to DOE, "the multiplicity of available routes, coupled with the scarcity of resources for training state and local personnel, makes it imperative that the Department adopt a more coordinated approach to selecting the routes for these shipments." The states also recommended that DOE develop a routing policy that would make the federal government, not the carrier, responsible for selecting routes to allow the most efficient use of emergency response resources by limiting the number of routes. Again, DOE has failed to respond to these requests.

**Need for an Analysis of Transportation Impacts from Fuel Blending**

DOE has proposed transporting to the proposed repository during the first two decades of repository operation, more highly radioactive fuel, than had been anticipated. By shipping the "hotter" or more radioactive younger fuel (not aged), the temperature of the surrounding drift can be raised. However, current transportation impact analyses are based on the concept of shipping the oldest, and less radioactive fuels first, allowing the younger fuel stored at the reactor sites to "age" or gradually lose radioactivity through radionuclide decay. A long-accepted, underlying premise for geologic disposal, as proposed in the 1980 Generic EIS, has been the concept of shipping "oldest fuel first." DOE's recent proposal for fuel blending, coupled with the desire of many utilities to ship the "youngest" fuel out of their pools to a Federal facility at the earliest opportunity, could result in large amounts of 5-10 year cooled fuel being shipped to the repository at the beginning of operations.

The Draft EIS transportation risk analysis assumes an average SNF "age" of 26 years. Shipment of "younger" SNF would result in considerably higher routine and accident radiological risks during handling, transport, and storage, increased risks that have not been addressed in the SEIS.

Fuel blending requirements for "hotter" spent nuclear fuel could result in a much greater reliance upon truck, as opposed to rail, for transporting spent fuel to the repository during the first two decades of repository operations. Current rail transport casks are designed to ship spent nuclear fuel older than 10 years. Fuel blending requirements for hotter spent fuel could result in truck transportation becoming the predominant or even sole mode for transporting spent fuel to the repository. Truck casks can carry fuel as young as 5 years out of reactor. Moreover, if the goal is to maximize the "flexibility of operations" at the fuel blending facility by maintaining a diverse inventory of spent nuclear fuel, reliance on truck transport would be further encouraged because of quicker loading, unloading, and overall turn-around times for truck casks. As a result, fuel blending could dramatically increase the numbers of truck, versus rail, shipments of spent fuel, which, in turn, could increase the number of shipments. Fuel blending could eliminate the previous goal of delivering large, multiple-purpose canisters, sealed and ready for emplacement, which would curtail or eliminate the economic advantage of shipping large canisters by rail.

**Need for Additional Groundwater Impact Analyses**

California's Inyo and San Bernardino Counties contain major portions of the aquifers through which radionuclides leaking from Yucca Mountain are predicted to travel. The Amargosa River system that may transport these same materials via surface water is also in these counties. Inyo County is within 17 miles from the Yucca Mountain site. Inyo County has noted that hydrogeologic studies conducted by Inyo County and Nye and Esmeralda Counties in Nevada point to the existence of a continuous aquifer running from beneath Yucca Mountain south to Tecopa, Shoshone and Death Valley Junction. These studies indicate that water flowing beneath Yucca Mountain flows southeast to become surface water flowing into Death Valley that is used for commercial, domestic, farming, and to support natural habitats.

California water quality agencies have concluded that DOE needs to perform a more complete evaluation of the potential pathways for radionuclides reaching regional groundwater supplies in eastern California, such as the Death Valley region. We note that DOE has made progress in addressing comments by California water quality agencies. For example, an additional monitoring well was completed in the carbonate aquifer and several monitoring wells in the alluvial aquifer were completed. In addition, pumping tests were conducted within the alluvial aquifer down-gradient and up-gradient of the site. However, better data and more realistic models continue to be needed to evaluate groundwater flow and radionuclide migration toward California aquifers before a determination can be made on the suitability of the proposed Yucca Mountain site.

To adequately characterize the hydrologic conditions of the Yucca Mountain flow and transport model, the hydrogeological evaluation of the site needs: (1) better evaluation of the relationship between the perched

water and the volcanic aquifer north of the site, to help determine the model boundary conditions. One monitoring well is not sufficient to determine water level for the up-gradient model boundary; (2) more accurate determination of the transient zone between the volcanic and alluvial systems to improve estimates of flow-time and concentration of radionuclides released from the repository; (3) increased certainty regarding groundwater flow beneath the site; (4) coordination and integration of modeling efforts with the US Geological Survey regional modeling effort that encompasses the area from south of Yucca Mountain to Death Valley; (5) studies to determine if groundwater flowing under Yucca Mountain discharges into Death Valley, Alkali Flat, or Ash Meadows; and (6) studies to determine whether the carbonate and volcanic groundwater systems are independent. More scientific attention needs to be given the hydrogeologic characterization of the carbonate aquifer in the vicinity of Yucca Mountain. The existing characterization, based on data from two wells, is insufficient to provide reliable interpretation of important hydrogeologic parameters such as hydraulic gradient and groundwater flow direction. In addition, DOE needs to describe how it will monitor or detect migration of radionuclides from the repository.

In spite of some progress that DOE has made in its hydrogeologic investigation, the level of uncertainty regarding potential groundwater impacts in California remains too high to support a reasonable decision on the suitability of the Yucca Mountain Site. Key uncertainties include the rate of corrosion of waste packages, the release of radionuclides into the environment, and the impacts on California from the potential migration of radionuclides from any leaks from the proposed repository.

**Need for Additional Analysis of Impacts on Wildlife, Habitat and Public Parks in California**

California's State Park System contains 265 part units encompassing 1.4 million acres of land within which the State is responsible for preserving the State's extraordinary biological resources and diversity. Nearly half of these State park units, including State Parks, State Historic Parks, State Beaches and State Recreational Areas, are located along potential spent fuel shipment routes in California. In addition, the Death Valley National Park, visited by 1.25 million tourists each year, is located adjacent to potential routes in California. DOE needs to evaluate the potential groundwater and transportation impacts on the Death Valley National Park and measures to mitigate these impacts.

**Responses to DOE's Suggested Topics for Public Comment**

California received a letter that DOE sent to stakeholders interested in the Yucca Mountain project. The letter contained suggested topics and questions regarding the proposed repository. We offer the following response to these questions.

**A. Please provide your views concerning whether the Yucca Mountain Preliminary Site Suitability Evaluation (PSSE) and other scientific documents produced by the Department provide an adequate basis for finding that the Yucca Mountain site is suitable for development of a repository. If you believe that certain aspects of the PSSE are inadequate, please detail the basis for this belief and indicate how the documentation might be made adequate with respect to these aspects.**

The documents provided by DOE to date, including the PSSE, do not provide the scientific basis and technical analyses necessary to support a site suitability determination. The Department 's analyses of the impacts of transporting spent fuel and high-level radioactive waste to the proposed repository and its analysis of potential groundwater impacts in California are inadequate, insufficient and do not address concerns raised by California and Western states since 1985. Without these analyses, the Secretary will not have sufficient information or basis on which to make a finding regarding the suitability of the Yucca Mountain site. Although DOE stated in 1986 that it would address in the EIS the anticipated impacts on corridor states of transporting spent fuel and high-level wastes, would provide route-specific analyses, and would include an evaluation of impacts on host states and states along transportation corridors, these analyses have not been completed. In the Supplement to the Draft EIS, DOE said it would address all aspects of the Proposed Action, such as the transportation of spent fuel and high-level waste and the no-

Action Alternative, in the Final EIS. DOE plans to issue the Final EIS at the same time as the Secretary submits his recommendation to the President. This would preclude the public and affected states from having an opportunity to review and comment on this transportation analysis before the recommendation is made to the President.

**B. If the Secretary determines that the scientific analysis indicates that the Yucca Mountain site is likely to meet the applicable radiation protection standards established by the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission, do you believe that the Secretary should proceed to recommend the site to the President at this time? If not, please explain.**

Inyo County contends that the EPA's radiation protection standards for the proposed repository are unacceptable, since they would allow for the contamination of those aquifers that support human populations and federally protected natural habitat in both the Armargosa Valley and Death Valley National Park. California would reject any proposal/design for the repository that could result in a release of radionuclides from the repository that, in turn, could result in groundwater contamination in California exceeding the EPA's radiation protection standards for groundwater or the California Department of Health Services' Maximum Contaminant Level for radionuclides.

**C. Are there reasons that you believe should prevent the President from concluding that the Yucca Mountain site is qualified for the preparation and submission of a construction license application to the Nuclear Regulatory Commission?**

Until DOE adequately addresses California's groundwater issues and uncertainties and until DOE addresses the transportation issues that have been identified by host and corridor states and until route-specific analyses of impacts are completed, there is insufficient information to respond to this question.

**D. If you believe that the Secretary should not proceed with a recommendation to develop a repository at Yucca Mountain, what mechanisms should be utilized to meet the Department's legal obligation to begin accepting spent nuclear fuel and high level radioactive waste?**

The Secretary should not make a recommendation regarding the suitability of the site until the necessary analyses have been completed. There is not sufficient information available upon which to base this decision. The suitability of the Yucca Mountain site is still in question until the necessary route-specific transportation analyses and scientific studies needed to evaluate potential groundwater impacts in California have been completed.

Specific comments on the Preliminary Site Suitability Evaluation that were prepared by the California Water Quality Control Board are attached.

Winston H. Hickox
*Secretary for Environmental Protection*

Gray Davis
*Governor*

**TO:** Commissioner Robert A. Laurie
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

**FROM:** Barbara L. Evoy, Chief
**DIVISION OF CLEAN WATER PROGRAMS**

**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

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:

•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@cwp.swrcb.ca.gov .

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