

## CALIFORNIA ENERGY COMMISSION

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COMMISSIONER

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Office of Civilian Radioactive Waste Management  
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Dear Ms. Dixon:

The State of California, through the California Energy Commission, appreciates the opportunity to comment on the *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada (DEIS)*.

Thirteen State of California agencies participated in this review of the DEIS. These agencies include the 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, Water Resources Control Board, and the Lahontan Regional Water Quality Control Board. Inyo County was also a principal participant in our review process.

California has significant concerns over the superficial and general discussion in the DEIS of potential transportation and groundwater impacts in California from the proposed repository at Yucca Mountain. Following our review, it is our conclusion that the DEIS is seriously inadequate and incomplete because it fails to: (1) fully disclose the transportation impacts from the proposed project; (2) fully evaluate realistic project alternatives, (3) identify and analyze potential route-specific and modal specific impacts to populations and the environment along shipment corridors, (4) adequately evaluate potential groundwater impacts in California, (5) address issues important to California that were identified early on in the public scoping process, and (6) provide adequate notice to impacted communities along transportation corridors of the significant transportation impacts from the proposed project. Absent this information, public stakeholders and decision-makers have an insufficient basis upon which to make decisions regarding the Proposed Action described in the DEIS.

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If you have any questions regarding these comments, please phone me at (916) 654-4001 or Barbara Byron at (916) 654-4976.

Sincerely,



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

Enclosure

Cc: Governor Gray Davis  
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Senator Barbara Boxer  
Congressman Jerry Lewis  
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Mr. Dwight Helmick, Commissioner, California Highway Patrol  
Mr. Wesley M. Franklin, Executive Director, California Public  
Utilities Commission  
Mr. Jose Medina, Director, Department of Transportation  
Mr. Harold Singer, Executive Officer, Lahontan Regional Water Quality  
Control Board

**STATE OF CALIFORNIA**

**Final Comments on**

**The Draft Environmental Impact Statement for a  
Geologic Repository for the Disposal of Spent Nuclear Fuel  
And High-Level Nuclear Waste at Yucca Mountain,  
Nye County, Nevada**

February 10, 2000

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## BACKGROUND

The State of California has reviewed the Department of Energy's (DOE) *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nevada* (DEIS). Our written comments on the DEIS were prepared through a cooperative interagency effort, coordinated by the California Energy Commission, that involved thirteen California agencies with expertise and/or regulatory authority in the areas of transportation, water quality, geology, hydrogeology, and environmental impacts. Participating California agencies included: 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, Water Resources Control Board, and the Lahontan Regional Water Quality Control Board. Our comments on the DEIS focus primarily on three areas that most directly impact California: (1) transportation impacts; (2) potential groundwater impacts in the Death Valley region; and (3) impacts on wildlife, natural habitat and public parks.

More detailed comments on the DEIS are attached that were prepared by the California Departments of Fish and Game, Transportation, Water Resources Control Board, and the Lahontan Regional Water Quality Control Board. We begin our comments with a summary of inadequacies of the DEIS in meeting the requirements of the National Environmental Policy Act (NEPA).

## GENERAL NEPA INADEQUACIES OF THE DEIS

The DEIS fails to comply with both the procedural and substantive requirements of NEPA by failing to: (1) provide an adequate scoping process, (2) provide a complete and accurate project description, including full disclosure of potential transportation impacts, (3) evaluate reasonable alternatives, (4) provide adequate notice of public hearings, (5) adequately evaluate the affected environment, and (6) adequately evaluate environmental consequences from the alternatives and the proposed project.

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1. Inadequate Scoping Process and Failure to Provide a Complete and Accurate Project Description.

The DEIS is too narrow in scope and does not provide a complete description and analysis of the proposed project including shipment routes and modes, number and characteristics of shipments, and a route-specific analysis of potentially impacted populations and environment from these shipments.

Before an agency prepares an EIS, NEPA regulations require "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." (40 CFR s 1501.7) As part of this process, DOE must "invite the participation of affected Federal, State, and local agencies, any affected Indian tribe, ... and other interested persons (including those who might not be in accord with the action on environmental grounds..." (Id.)). DOE did not conduct an adequate scoping process. Although DOE held 15 public scoping meetings across the country including one in Sacramento, the DEIS does not reflect the scope of issues raised at these meetings.

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For example, Daniel Nix, representing California and the Western Interstate Energy Board High-Level Waste Committee, testified at the scoping hearing in California that it is "crucial...that DOE conduct route and mode-specific analyses of transportation impacts as part of the Yucca Mt. EIS." He further recommended that DOE should 1) perform an integrated modal analysis that incorporates realistic potential routes, 2) allow for state involvement in the designation of routes, 3) identify and describe DOE's modal choice, 4) state DOE's intentions regarding full scale cask testing, 5) develop highway and rail routing policies, 6) develop policies regarding Section 180 (c) assistance, and 7) recognize the proximity of Death Valley National Park to the Yucca Mountain site and give special consideration to the need for regional groundwater impact evaluations. However, the scope of impacts evaluated in the DEIS are limited and do not reflect the explicit requests by California for analyses related to potential groundwater and route-specific transportation impacts in California. If proper scoping had occurred, states' concerns expressed early to DOE presumably would have determined the range of actions, alternatives, and impacts to be considered in the EIS. However, the DEIS fails to consider all reasonable alternatives and fails to consider the full range of direct, indirect, and cumulative impacts as discussed below.

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A complete and adequate EIS must present a comprehensive review of the proposal upon which well-informed decisions can be based. The whole of a proposed action should be considered in any proposed project. Segmenting or piece-mealing a project into smaller parts has the effect of avoiding full disclosure of environmental impacts and nullifies public involvement. DOE has "underreported" the potential transportation impacts of the proposed Yucca Mountain project. This approach virtually ensures that the decision-makers will act on incomplete information, thereby violating the spirit and intent of NEPA. Detailed consideration of transportation impacts should not be deferred to future environmental impact assessments.

Recommendation: The DEIS should provide full disclosure of the proposed project including potential transportation and groundwater impacts in California.

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## 2. Inadequate Consideration of Project Alternatives.

Under federal law, the alternatives section is considered "the heart of the environmental impact statement." (40 CFR S 1502.14). According to federal regulation, the EIS must "[r]igorously explore and objectively evaluate all reasonable alternatives" and must discuss the reasons for eliminating any from detailed study. (Id.) Included in an alternatives analysis must be "substantial treatment of each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits." (Id.) In addition, alternatives to be considered must include alternatives "not within the jurisdiction of the lead agency." (Id.) Therefore, the alternatives section should be comprehensive and discuss all reasonable alternatives, including alternate sites.

The only alternatives examined in the DEIS are two variations on the "no action" scenario. These two no-action scenarios are that: (1) the waste would remain in dry storage at the present sites for 10,000 years with "institutional controls" for either the full 10,000 years (extremely costly) or (2) institutional controls for just 100 years, after which no controls are assumed to protect public health and safety (disastrous consequences in radionuclide leakage into the atmosphere, soil, surface and ground water environment). DOE considers these two scenarios as providing a "baseline for comparison" to the proposed action. However, these are not realistic alternatives. The DEIS recognizes

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that neither of the "no-action" scenarios would be likely if a repository was not developed (DEIS, page S-29). As the DEIS indicates, both commercial and DOE sites have an obligation to continue managing the spent nuclear fuel and high-level radioactive waste in a manner that protects public health and safety and the environment. Therefore, the no-action scenario of no institutional controls over these wastes after 100 years is highly unrealistic and does not provide decision-makers with reasonable alternatives for comparison with the Proposed Action.

Recommendation: The DEIS should evaluate other more realistic and reasonable project alternatives, including those mentioned in the DEIS, including: (1) permanent on-site storage at the current locations, (2) storage at one or more centralized locations, (3) waste volume reduction and consolidation at existing sites, and (4) other available technologies for storage of spent fuel and high-level waste.

### 3. Inadequate Public Notice of Hearings

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The notice for the public hearings and the DEIS is seriously deficient by failing to identify rail and truck routes through California and potentially impacted communities. These communities have no means of evaluating the relevance of the proposed action unless potential route-specific transport impacts are disclosed.

One of the reasons Congress passed NEPA was to give interested citizens and organizations a role in the federal agency decision-making process. In order for people to participate in the NEPA process, they must first be informed that a major federal action has the potential to impact them and their communities. Even though DOE conducted hearings in Nevada and throughout the U.S., DOE has made no effort to inform the citizens and public officials of California of the relevance of the proposed action to them and their communities. Most Californians along potential transport corridors have no way of knowing to what extent they will be impacted by the Yucca Mountain repository project. Only one hearing was held in California (in Lone Pine, a remote location), and this hearing was held only at the specific request of Inyo County. The notices for the public hearings do not indicate that people in California, for example, Inyo and San Bernardino Counties, may be significantly impacted by nuclear waste shipments as a direct result of the Yucca Mountain project. California and San Bernardino County officials strongly objected to the lack of notice and public hearings in San Bernardino County. As a result, a public hearing has been scheduled in San Bernardino for February 22, 2000. However, absent any information on routes, people in other regions of California who will be affected by the transportation impacts from the Proposed Action have no way of determining the sufficiency of the DEIS' analysis of impacts.

Recommendation: After identifying routes and modes and impacted communities along shipment corridors, DOE should hold public hearings in California, including the major cities and regions in California that will be potentially impacted by these shipments.

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### 4. Inadequate Consideration of Affected Environment and Environmental Consequences

The NEPA regulations require the EIS to describe the environment of the area(s) to be affected or created by the alternatives under consideration (40 CFR S 1502.15). By failing to consider alternative transportation modes and routes in sufficient detail, the

DEIS does not adequately describe the environments of all areas that would be affected by the various alternatives.

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In addition, the EIS is required to provide the "scientific and analytic basis for the comparisons" in the alternatives section. (40 CFR S 1502.16). All of the direct, indirect, and cumulative effects of all alternatives and the proposed action must be discussed. Further, the EIS must discuss "possible conflicts between the proposed action and the objectives of Federal, regional, State and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned." (Id). Where there are conflicts, the EIS should discuss "the extent to which the agency would reconcile its proposed action with the plan or law." (40 CFR S 1506.2.) California, for example, may have land use or other laws or regulations with which the transport of nuclear waste would be inconsistent or in conflict with the Proposed Action. DOE has an obligation to cooperate with affected states and help integrate the EIS into state and local planning processes. (Id.) By describing the scope of action too narrowly, the EIS has failed to consider state and local planning processes.

Recommendation: The revised DOE should discuss how DOE will integrate the EIS into state and local planning processes and should describe the direct, indirect and cumulative effects in California of the Proposed Action compared to alternatives.

#### 5. Need for a Revised Draft EIS

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If a draft EIS is "so inadequate as to preclude meaningful analysis," DOE must "prepare and circulate a revised draft of the appropriate portion." (40CFR S 1502.9). We believe that transportation issues, including logistics and risks, should be addressed in greater depth and are, in fact, deserving of a separate DEIS.

Recommendation: DOE should revise the DEIS and more fully discuss the transportation and water quality impacts from the proposed project as described below. DOE should prepare a separate DEIS on mode and route-specific transportation impacts as discussed below.

### INADEQUATE DISCUSSION OF POTENTIAL IMPACTS

#### 1. Transportation

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Transportation is the single area of the proposed Yucca Mountain repository project that will affect the most people across the US, since the shipments will be travelling cross-country on the nation's highways and railways. As a result of the Proposed Action, 70,000 metric tons of radioactive waste from 77 individual sites will be transported to the proposed repository. It is essential that a full analysis be made of the ramifications and impacts of this massive transportation program. However, the DEIS' analysis of the transportation risks is too general and superficial and does not provide sufficient detail to evaluate potential impacts. For example, there is no description of the transportation of spent fuel and high-level waste 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.

66 The massive scale of radioactive waste shipments to the proposed repository will be unprecedented. Total annual shipments of these wastes are projected to increase within the next decade from the current 15 to 25 rail shipments per year to between 400 to 600 rail shipments per year (Federal Railroad Administration, June 1998). The State of Nevada's preliminary estimates of potential legal-weight truck shipments to Yucca Mountain through California and Nevada show that an estimated 74,000 truck shipments, about three-fourths of the total, could traverse southern California under DOE's mostly truck scenario. This could be an average of five truck shipments through California every day for 39 years. Under a mixed truck and rail scenario, California could receive an average of two truck shipments per day and 4-5 rail shipments per week for 39 years. The State of Nevada estimates that under a "best case" scenario that assumes the use of larger rail shipping containers, there would be more than 26,000 truck shipments and 9,800 rail shipments through California. This represents a large increase in both scale and complexity of operations compared to past shipments.

Likely routes in California would impact Sacramento, the Los Angeles area, San Luis Obispo, Santa Barbara, San Bernardino, Fresno, Bakersfield, Barstow and smaller cities and communities. Under a consolidated southern routing strategy, Nevada has stated that the likely east-west highway corridors would be I-44 from Missouri to Oklahoma, I-40 from Tennessee to California, and I-15 from California to Nevada. The most likely east-west rail corridor would be the Santa Fe-Burlington Northern line from Kansas City to San Bernardino, connecting with the Union Pacific from San Bernardino to Nevada.

a. Need for a Comprehensive Transportation Program for NWSA Shipments

DOE has not responded to long-standing western states' priorities and public official requests to develop a comprehensive transportation program for nuclear waste shipments to the proposed repository. Since 1985, California and other Western States, acting through the Western Governors' Association and the Western Interstate Energy Board, have consistently urged DOE to develop a comprehensive transportation program for spent fuel shipments.

Western states have urged DOE to recognize states' priorities regarding spent fuel and high-level waste shipments including among others: (1) full-scale cask testing, (2) mode and routing analysis, (3) DOE providing timely financial and technical assistance to states for emergency response preparation, (4) DOE using the WIPP transport program as a model in radioactive waste transport planning; and, (5) thoroughly evaluating terrorism and sabotage concerns. The Western Governors' Resolution 99-014 clearly states the need for DOE to develop a comprehensive transportation plan for these shipments. DOE's progress in all of these areas, as reflected in the DEIS, continues to be poor and unresponsive to states' concerns.

The WIPP transportation program represents a positive example of states and DOE working together over several years to develop a comprehensive transportation safety program that is acceptable to states and DOE alike. WIPP shipment corridors were identified well in advance of the shipments to allow states an opportunity to provide input into routing decisions. WIPP transport safety, public information, and emergency response preparedness programs also were developed well in advance of the first shipment. In comparison, DOE's transportation program for shipments to the proposed Yucca Mountain repository, as illustrated by the serious shortcomings of the

transportation discussion in the DEIS, has made little progress in developing a transportation plan.

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**Recommendation:** DOE should develop a comprehensive transportation program for shipments to the Yucca Mountain site, using the successful WIPP Transport Safety Program as a model. The revised EIS should include a full and detailed discussion of this program.

b. Need for DOE to Identify and Analyze Routes

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The DEIS' failure to identify and analyze routes and modes for shipments to the proposed Yucca Mountain repository directly contradicts earlier DOE commitments to provide such analyses. In DOE's Yucca Mountain Environmental Assessment of 1986, 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. The route-specific analyses to be performed in the future will proceed in the following sequence: (1) define important parameters; (2) gather data; (3) develop models as required; (4) perform analyses; (5) consider mitigating measures; (6) report results." (Volume III, DOE's Yucca Mountain Environmental Assessment, 1986).

However, despite DOE's promise to provide route-specific analyses in the EIS, the DEIS fails to do so. Instead, the DEIS simply states that

"[a]t this time, about 10 years before shipments could begin, DOE has not determined the specific routes it would use to ship spent nuclear fuel and high-level radioactive waste to the proposed repository...this analysis used current regulations governing highway shipments and historic rail industry practices to select existing highway and rail routes to estimate potential environmental impacts of national transportation. Routing for shipments of spent nuclear fuel and high-level radioactive waste to the proposed repository would comply with applicable regulations of the Department of Transportation and the Nuclear Regulatory Commission in effect at the time the shipments occurred." (DEIS, Appendix J, J-23)

Depending on routes ultimately selected, California could have thousands of additional shipments in the southern part of the State from southeastern and Mid-Atlantic region reactors. States such as California must have adequate time to consider routing alternatives as part of the overall process of determining the suitability of a repository in light of California's relatively large number of reactors and shipments, lengthy transportation routes, and large urban centers that will be impacted by these shipments.

**Recommendation:** The revised EIS should identify and analyze shipment routes to the proposed repository, as well as disclose the procedures and methodology used for selecting these routes. The route-specific risk analysis methodology should be subject to state, tribal, and public review as part of the revised EIS.

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c. Routing and Emergency Response Concerns in California

California transportation agencies have expressed concern over the possibility that DOE may decide to route through California a major portion of the Yucca Mountain shipments using roads not designed for heavy truck traffic. This concern was heightened recently when DOE decided to reroute through southern California, including California State

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Route 127 (SR-127), thousands of low-level radioactive waste shipments from eastern states to the Nevada Test Site in order to avoid nuclear waste shipments through Las Vegas and over Hoover Dam.

California is concerned about the inherent risk and potential detrimental impact to highway and local roads and the surrounding areas as a result of this additional heavy truck traffic. Alternate routing, such as that proposed for low-level wastes shipments to the Nevada Test Site, will take shipments off the interstate highway system and place them instead on state routes and local roads that are not designed or maintained to the same standards as the interstate highway system. As an example, although SR-127 is not approved for Highway Route Controlled Quantity (HRCQ) shipments, such as spent fuel shipments, SR-127 is mentioned on page 2-73 of the DEIS as part of a potential highway route within California that includes I-40 from Needles to Barstow, I-15 from Barstow to Baker, and SR-127 from Baker to the Nevada State line.

SR-127 is a two-lane, asphalt highway, approximately 85 miles long, located in relatively isolated portions of eastern San Bernardino and Inyo Counties, California. The highway is subjected to intense desert heat, as Death Valley often reaches the highest temperature in the US, with long periods of no rainfall. Both conditions make the roadway susceptible to disrepair. Additional heavy traffic, such as from the transport of thousands of low-level radioactive waste shipments to Nevada as well as the transport of a major portion of 70,000 tons of Yucca Mountain spent fuel shipments, would hasten the deterioration process. Excessive numbers of shipments by heavy trucks on SR-127 would require complete reconstruction of some sections of the roadway.

Further, SR-127 is not an engineered route. Most of SR 127 originated as a wagon trail that was paved over a period of time to accommodate tourists to Death Valley resulting in large sections of roadway that are not built on proper base materials. During certain times of the year, this route is the primary access road for thousands of tourists to the Death Valley National Park. It has tight horizontal and vertical curves where visibility is limited, sustained grades, and dozens of washes crossing both under and over the pavement. The road does not include turnouts or wide shoulders and is subject to periodic flash flooding.

The availability and timeliness of emergency response in the event of a radioactive waste transport accident along SR-127 is also of concern. For example, in the event of an emergency, responders and equipment would be extremely delayed in arrival at an accident scene. In case of a serious toxic or radiological release in Inyo Co., specialist response teams must be brought in from either San Bernardino or Bakersfield, a process which takes a minimum of 3-4 hours, assuming the response team is not already responding to another incident in their heavily populated region. Further, there is only a total of four access roads along the entirety of SR-127, and two of those roads are paved but undivided. The nearest medical trauma center facilities are located at Barstow or Las Vegas, both located at least an hour and a half away by ground transportation.

The Nuclear Waste Policy Act (NWPA) Section 180(c) calls for federal action to provide improvements in emergency response training and capability along routes designated for shipments of spent fuel and high-level nuclear waste. 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

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compliance with 180(c) costly to complete. For example, the 50 miles along SR-127 in Inyo County are served by a single volunteer fire department that has inadequate funding. At present there are few California Highway Patrol officers or other first responders along SR-127. Even if emergency response training were provided along SR-127, there are very few people along this route to train.

The DEIS does not provide estimates of the resources needed to meet its obligations under 180(c). The State and local communities along the routes would be burdened by significant new costs to protect its residents. The scarcity of emergency response resources along certain potential routes in California makes it very unlikely that the federal government would be able to meet its obligations under NWPA without a major commitment of funding and extensive effort.

Recommendation: DOE should identify roadway and emergency response improvements and associated costs necessary to protect the public and resources along shipment corridors, consistent with NWPA 180 (c). DOE should commit to working with the State of California and local jurisdictions allowing sufficient time prior to the first shipment to develop transport and emergency response plans, training, and exercises.

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#### d. Need for DOE, Not Carriers, to Select Shipment Routes

The DEIS used current regulations governing highway shipments and historic rail industry practices to select truck and rail routes to identify potential environmental impacts of transportation. As a representative from the Western Interstate Energy Board's High-Level Radioactive Waste Group recently testified in the DEIS proceedings, western states believe that reliance on current highway routing regulations and historical rail routing practices to determine transport routes for spent fuel shipments to Yucca Mountain is insufficient. Highway routing regulations, for example, would allow the use of the Interstate Highway System for nuclear waste shipments to Yucca Mountain. Forcing states and tribes to prepare for nuclear waste shipments along all of these possible routes would be extremely costly and inefficient and could hinder the effectiveness of emergency response capability in the event of a serious transportation accident.

In 1998, the majority of states through their representation on regional nuclear waste transport planning groups<sup>1</sup> in a consensus letter to DOE wrote that

"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 letter also recommended that DOE develop a routing policy that would: (1) make the federal government, not the carrier, responsible for route selection to allow the most efficient use of emergency response resources by limiting the total number of routes;

<sup>1</sup> Western Interstate Energy Board's High-Level Radioactive Waste Committee, the Council of State Governments' Midwestern High-Level Radioactive Waste Committee, the Northeastern High-Level Radioactive Waste Transportation Task Force, and the Southern States' Energy Board's Advisory Committee on Radioactive Materials Transportation and Transuranic Waste Transportation Working Group

and (2) provide states and communities sufficient time to prepare for shipments by identifying national routes well before shipments begin.

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Recommendation: DOE, and not carriers, should select and evaluate spent nuclear fuel/high-level waste shipment corridors.

e. Need for DOE to Analyze and Select Transport Modes

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The DEIS fails to analyze and select a preferred transportation mode for shipments to the proposed Yucca Mountain repository. The choice among the use of rail, truck or barge for the transport of nuclear waste under the NWPA will have a major impact on the number of shipments, populations impacted, and routes selected. If rail is selected, for example, most of the rail lines traverse major urban areas since major urban areas developed around rail centers, and, it is likely that the thousands of spent fuel shipments will traverse some of the most heavily populated areas, with limited alternatives for avoiding these areas. Further, rail routes were developed to meet commercial needs, and may not necessarily reflect public safety concerns.

The DEIS is limited to two generic analyses: "mostly legal-weight truck" and "mostly rail" scenarios. The DEIS recognizes that neither one is likely by stating that "the Department does not anticipate that either the mostly legal-weight truck or the mostly rail scenario represents the actual mix of truck or rail transportation modes it would use." DOE uses these scenarios to address the range of possible transportation impacts (DEIS, p. 6-18). However, because of the significant impact modal choice will have on the number of shipments, populations affected, and routes selected, the DEIS fails to meet the requirements of NEPA to properly assess the transportation-related impacts of potential spent fuel shipments to the proposed repository.

If rail is selected, the California Public Utilities Commission Railroad Safety Branch will engage in inspections, investigations, and surveillance activities with respect to the Federal Railroad Administration's State Safety Participation Regulations (49 CFR part 212) issued under authority of 49 U.S.C. 20101 et seq., subpart V. If these shipments are to be made by rail in California, California inspectors will conduct inspections relating to the five railroad safety disciplines of Track, Motive Power and Equipment, Signal and Train Control, Operating Practices and the Transportation of Hazardous Materials

Recommendation: DOE should analyze and select the transport modes for shipments to the repository, including identifying intermodal (rail to truck transfer locations or vice versa) options and locations. The numbers of shipments and routes need to be identified, as well as the estimated costs to states for truck and rail safety inspections. Modal selection should be optimized for each generator site to minimize public health and safety impacts.

f. Need for a Comprehensive Transportation Analysis of Public Risks and Costs

The DEIS does not provide any meaningful quantitative transportation risk assessment, but instead refers to other agencies' regulatory authority. For example, DOE addresses transportation accident hazards by simply stating that transport of wastes will occur in accordance with U.S. Department of Transportation regulations.

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Any analysis of transportation risks associated with shipping spent fuel is extremely sensitive to the assumptions made regarding, for example, routing, the amount of material shipped by rail versus truck, and the number of people along the routes and at various stops. The DEIS uses the "Modal Study" (NRC 1987) to predict very low probabilities of release of radioactive materials from a spent fuel cask under accident conditions. These analyses and risk analysis tools such as RADTRAN, although accepted by federal agencies for assessing transportation risks, have been criticized because of changing assumptions about cask capacity (new-generation casks will have much larger capacities), the radioactive characteristics of the spent fuel (radioactivity varies with fuel age and burn-up levels), the role human error may play in manufacturing, quality control and operation of the casks, and the risk of sabotage or terrorist threat against a shipment.

In addition, tools such as RADTRAN incorporate critical assumptions about roadway geometrics and maintenance standards that require review if non-interstate routes are to be considered. The large projected increase in the numbers and operational complexity of spent fuel shipments to the proposed repository, in comparison with past shipments, may result in greater opportunities for human error in construction and operation of the spent fuel shipping casks. These factors should be taken into consideration in the DEIS' transportation risk assessment.

Further, the DEIS should provide a route-specific evaluation of the increased transport risk as the result of earthquakes, flooding, poor road conditions, and weather conditions. In addition, some routes leading to the Nevada Test Site/Yucca Mountain area are heavily traveled tourist and recreational routes. These routes can be greatly impacted by increased traffic. Increased truck traffic could influence the safety, reliability and congestion characteristics of these routes. The EIS should evaluate such potential impacts.

Recommendation: DOE should conduct a comprehensive risk analysis of routes and transport modes including public risks and costs to states, tribes and local communities to prepare for these shipments. When the proposed routes are identified in California, future EIS analyses should include a complete environmental review, including route-specific environmental analyses, in accordance with the requirements of the Clean Air Act, NEPA and the California Environmental Quality Act. This routing analysis of the primary and secondary routes should include structural and geometric road characteristics, emergency response capabilities along these routes, socio-economic impacts, wildlife, habitat, and public parks impacts, as well as risks to human populations along these routes. The DEIS should identify the significant fiscal impacts of emergency response preparation for these shipments and necessary road and rail improvements.

#### g. Compliance with State Hazardous Waste Permit Requirements

Activities conducted in California associated with the Yucca Mountain Project must comply with State hazardous waste management regulations, including permitting requirements and the California Environmental Quality Act (CEQA) requirements. The State of California, through the Department of Toxic Substances Control (DTSC), is responsible for regulating any activity that generates, transports, treats, stores or disposes of hazardous waste. DTSC is authorized by the US Environmental Protection Agency to act as the permitting agency for hazardous waste facilities under the

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Resource Conservation and Recovery Act (RCRA). Any treatment of hazardous waste generated from commercial nuclear facilities that does not meet the RCRA definition, but does meet the California-only waste non-RCRA definition, would require a non-RCRA permit or authorization of DTSC for each site. Furthermore, DTSC is required to comply with the provisions of the California Environmental Quality Act (CEQA) in evaluating potential impacts associated with the issuance of RCRA or non-RCRA permits for any activities in California associated with the Yucca Mountain Project.

Recommendation: The DEIS should state that any hazardous waste management activities related to the proposed project must be appropriately permitted and that DOE will comply with all State permit requirements for the proposed project, including the California Environmental Quality Act requirements.

## 2. Water Quality and Water Quantity Impacts

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### a. Need for a More Thorough Evaluation of Potential Groundwater Impacts in California

Inyo County, California testified before DOE on the long-term threat that the Yucca Mountain repository poses to regional groundwater supplies and to communities east of Owens Valley. 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 generally south to become surface water and groundwater flowing into Death Valley that is used for commercial and domestic purposes and supports natural habitats. Some of these springs also support populations of a number of threatened or endangered species.

In addition to determining potential pathways for radionuclides, the DEIS should evaluate the effect of DOE's proposed groundwater extraction in Jackass Flats on the flux or rate of flow of groundwater to discharge areas of the regional aquifer in California. The groundwater extraction proposed at Jackass Flats will eventually exceed the perennial yield that has been defined in the DEIS. All extraction, even that which does not exceed perennial yield, will decrease the amount of water that flows through the aquifer and is discharged at down-gradient springs and wetlands. This decrease would almost certainly affect such habitat deleteriously.

The source of the water at Jackass Flats will be supplied by (1) more water entering the ground-water system (increased recharge), (2) less water leaving the system (decreased discharge), and/or (3) removal of water that was stored in the system, or some combination of these three. It is unlikely that recharge will increase. Since recharge will probably not increase, we are left with the conclusion that less water will be discharged from the aquifer, and the amount of groundwater in storage will be decreased. Both of these results will decrease the down-gradient groundwater supply from the regional aquifer to springs and wetlands.

Recommendation: The DEIS should more fully evaluate potential pathways for radionuclides reaching regional groundwater supplies in eastern California, such as in the Death Valley region. The DEIS should evaluate the above-referenced studies and include them in their analyses of the potential migration of radionuclide contaminants to

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regional groundwater supplies. The DEIS should also include a discussion of proposed methods, including monitoring wells and water resource studies, to determine the amount of change in flux that can be expected, the potential effects of that change on aquatic and riparian habitat and water supply, and proposed mitigation procedures.

b. Need for a Better Characterization of Regional Hydrology in the Amargosa and Death Valley Regions

19

More data and better, more realistic models are needed to demonstrate whether radionuclide travel times through the unsaturated zone are sufficiently long to allow the unsaturated zone to serve as a substantive natural barrier to radionuclide migration. From California's perspective, the principal geologic/water quality issue related to the Proposed Action is the potential radionuclide contamination and transport of contaminated groundwater toward California. The relation between groundwater conditions beneath Yucca Mountain and ground/surface water in California is a critical issue of concern for California. The source of water at Furnace Creek in California is not well known. It may either be from sources within the Nevada Test Site or from the Spring Mountains near Las Vegas. Moreover, the geology of the aquifers is not well known. The source of the water at Furnace Creek is significant in evaluating the potential impact of a repository at Yucca Mountain on California water supplies and should be analyzed in the EIS.

DOE appears to be proposing a repository system that is likely to fail, leak radionuclides into the environment, and hope that man-made barriers and the natural environment can dilute the radionuclide concentrations below certain federal health-based limits for radioactive material releases before reaching the biosphere. However, based on the limited amount of data available, groundwater appears to move through the saturated zone from Yucca Mountain to the accessible environment (20-30 km away) in less than the 10,000-year regulatory compliance period. Rather than characterizing Yucca Mountain in terms of its suitability to contain the waste for the prescribed time period, most of DOE's efforts have been focusing on the engineering aspects of site development and waste placement. Significant uncertainties remain about the long-term performance of each proposed barrier and additional studies are needed to demonstrate that containment can be achieved for the statutorily required 10,000-year period.

Recommendation: The DEIS should better characterize regional hydrogeology in the Amargosa and Death Valley areas. Better data and more realistic models are needed to evaluate groundwater flow and radionuclide contaminant migration toward aquifers in California.

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c. Need for Hydrogeologic Cross-Section and Water Level Maps

The DEIS does not contain a hydrogeologic cross-section--a basic tool for evaluating the potential impact of contaminants on groundwater-- to help evaluate potential groundwater migration from the proposed repository into the Amargosa and Death Valleys. The EIS should include the cross-section as well as maps showing water level isocontours. Without this information, potential environmental impacts to groundwater in California cannot be reasonably assessed. In addition, the DEIS' characterization of the carbonate aquifer in the vicinity of Yucca Mountain is insufficient. It appears that only a single well completed in this aquifer was tested. This method does not provide reliable data on groundwater flow direction or aquifer hydraulic conductivity. More field data are

needed to enhance the computer-modeling effort. Without the actual parameters of the aquifer, it is difficult to judge the model's reliability for predicting the fate and transport of radionuclides 10,000 years into the future.

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Recommendation: The DEIS should include a hydrogeologic cross-section and maps showing water level isocontours to help evaluate potential groundwater migration from the proposed repository into the Amargosa and Death Valley regions. More field data on groundwater flow direction or aquifer hydraulic conductivity are needed to enhance the computer modeling effort.

21

d. Need for a Monitoring Program to Detect Radionuclide Migration

The DEIS does not describe monitoring programs of the unsaturated and saturated zones to evaluate a potential migration of radionuclides from the repository. A well-designed, constructed and operated monitoring system is necessary to detect such a migration. The DEIS should explain how groundwater will be monitored, what monitoring devices will be used, how the monitoring network will be determined, how the unsaturated zone will be monitored, and how repository drifts and nuclear waste containers will be monitored.

Recommendation: The DEIS should propose a monitoring program for the saturated and unsaturated zones for detecting the potential migration of radionuclides from the repository.

22

e. Need to Reconsider the Benefits of Hot Thermal Load Alternative

The "high thermal load alternative" would appear to be more protective for the groundwater under the proposed repository than the proposed "low thermal load alternative". The low thermal load alternative appears to be more risky and labor intensive, to cause more environmental disturbances, and to increase a chance of fault(s) and fractures interception by repository drifts.

Recommendation: DOE needs to reconsider the hot thermal load alternative's benefits for protecting groundwater from radionuclide contamination.

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f. High Level of Uncertainty Regarding Potential Repository Impacts

The level of uncertainty regarding key elements of the project's impacts is too high to support a decision on the adequacy of the proposed project site. This uncertainty is based either upon a current lack of information, disagreement among experts, or the considerable length of time involved in the exposure of the environment to project impacts. Examples include: (1) scientific disagreement over groundwater levels and aquifer conductivity estimates; (2) the unknown amount of inflow to and outflow from volcanic aquifers from each source; (3) the unknown influence of heat on water movement in the unsaturated zone with the result that much higher seepage rates could occur into the repository than the DEIS considered, (4) differing opinions regarding the release and solubility of major radionuclides, (5) high degree of uncertainty regarding the corrosion rate of waste packages that could occur within several hundred years, and (6) high levels of uncertainty regarding water seepage through the walls of the repository.

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Based on these uncertainties, the corrosion of waste packages will occur over an unknown amount of time, result in the release of unknown amounts of radioactive material into the environment, and may result in unknown impacts to California from the potential migration of radionuclides. The DEIS contains far too many uncertainties to allow a reasoned, well-founded decision on the advisability of constructing the project at Yucca Mountain. Further, the environmental consequences of long-term repository performance include three thermal load scenarios for evaluation, but the DEIS does not discuss the potential for long-term climate change to radically change the underlying assumptions for the evaluation. For example, a far wetter climate within the next million years could radically alter groundwater movement and waste container disintegration and deterioration.

Recommendation: The DEIS should address the high level of uncertainty regarding the performance of engineered and geologic barriers for isolating the nuclear waste, including potential long-term climate changes.

### 3. Impacts on Wildlife, Natural Habitat and Public Parks

#### a. Need for Complete Description and Analysis of Impacts on Wildlife, Natural Habitat and Public Use Parks.

24

The California State Park system includes 265 park units encompassing 1.4 million acres within which the State is responsible for preserving representative samples of the extraordinary natural and cultural resources and biological diversity of our State. Along these routes is approximately half of California's park units including State parks, State historic parks, State beaches as well as National parks. The EIS should evaluate the potential impacts along shipment corridors to fish and wildlife populations, natural habitat, and public parks in California, as well as proposed mitigation measures to offset these impacts.

There is no discussion in the DEIS of potential long-term adverse impacts to animals and plants. All of the DEIS' long-term evaluations are based on human health considerations. The DEIS makes the faulty assumption that the few predicted latent cancer fatalities from the proposed project will result in no impacts on the aquatic, wildlife and plant populations that are dependent upon the water resources potentially affected by the project. These natural populations have taken tens of thousands to millions of years to adapt to their current habitats. These time scales should be considered in determining potential impacts to these populations.

Further, transportation routes could potentially impact habitat for threatened or endangered species. The DEIS should include a description of transportation routes, including road or rail construction or improvements in California, and impacts to species identified as of concern. (See the attached letter from the California Department of Fish and Game.) For example, desert bighorn sheep in California could be adversely impacted by potential transportation corridors in the Death Valley region. Bighorn sheep movement, and consequently their ability to forage for food and reach water sources, could be severely impacted by the construction of new highways, railroads, or road improvements that include barriers or fences.

Recommendation: The DEIS should provide a complete description and analysis of potential transportation impacts on wildlife, natural habitat and public use parks.

## CONCLUSIONS AND RECOMMENDATIONS

California has significant concerns over the superficial and general discussion in the DEIS of potential transportation and groundwater impacts in California from the proposed repository at Yucca Mountain. Following our review, it is our conclusion that the DEIS is seriously inadequate and incomplete because it fails to: (1) fully disclose the transportation impacts from the proposed project; (2) fully evaluate realistic project alternatives, (3) identify and analyze potential route-specific and modal specific impacts to populations and the environment along shipment corridors, (4) adequately evaluate potential groundwater impacts in California, (5) address issues critical to California that were identified early on in the public scoping process, and (6) provide adequate notice to impacted communities along transportation corridors of the significant transportation impacts from the proposed project.

25

In light of the significant transportation impacts in California from the proposed NWPA shipments, California will need sufficient time and resources to conduct a thorough review of planned shipments to determine any necessary infrastructure improvements, as well as to develop transportation safety and emergency response programs. DOE must commit to the following as a prerequisite to NWPA shipments in California: 1) fix the shipping origins, destination points, transport modes, and routes as early as possible, at least 3-5 years before the first shipment, and require carriers to use these routes; 2) with State and local input, develop responsible criteria for selecting routes; 3) prepare a comprehensive transportation plan that includes the analysis of all needed transport-safety activities; 4) work cooperatively with the states and local jurisdictions along shipment corridors to ensure the safe transport of these wastes; 5) provide financial support for necessary highway and rail improvements, maintenance and rehabilitation, emergency response training and equipment a minimum of 3-5 years before the first shipment; 6) follow the WIPP Transportation Safety Program example for developing transport safety and emergency response plans and training programs; 7) review accident and terrorism response plans, 8) conduct a needs assessment in California, using input from state and local agencies, for road or rail safety improvements, emergency response training and equipment needs, and overall route improvements, and (9) form a working committee with state and local jurisdictions along shipment corridors at least 3-5 years prior to the first shipment to facilitate coordination, cooperation, communications and training.

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In conclusion, the information and analyses provided in the DEIS are insufficient to support a well-informed decision regarding the adequacy of the Yucca Mountain site for a high-level nuclear waste repository and the potential environmental impacts that could result from the construction, operation, and closure of this repository.

## DETAILED COMMENTS BY CALIFORNIA AGENCIES

Detailed comments are attached that were prepared by the State of California Departments of Fish and Game, Transportation, Water Resources Control Board, and the Lahontan Regional Water Quality Control Board.

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EIS001622

State of California

JAN 25 2000

Business, Transportation and Housing Agency

# Memorandum

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

Date: January 21, 2000

File: 135

Attention: Barbara Byron

From: DEPARTMENT OF TRANSPORTATION  
TRANSPORTATION PLANNING - MS-32

Subject: California Department of Transportation's Review of the Federal Department of Energy's (DOE) Draft Environmental Impact Statement for the Proposed Federal High-Level Nuclear Waste Repository at Yucca Mountain, Nevada

Thank you for the opportunity to review and comment on this Draft Environmental Impact Statement (DEIS) for the proposed Yucca Mountain, Nevada repository. The California Department of Transportation (Caltrans) Headquarters offices of Maintenance and Transportation Planning, and Caltrans District 9 and District 8 have reviewed this document. We have the following recommendations and comments on this proposal:

26

- The DEIS is inadequate because it does not specifically identify the routes (primary, secondary, or emergency response) or the mode (truck or rail) of transport. The DEIS rail analysis assumes ultimate delivery to the proposed repository will be via an unconstructed rail line in Nevada, or by heavy-haul truck routes exclusively within Nevada. Present regulations require shipping of High-Level Nuclear Waste (HLNW) on specifically defined highway routes, primarily the Interstate highway system, and rail routes determined by the industry. Primary, secondary and emergency routes and modes of transport need to be identified so that project impacts can be reasonably evaluated. If intermodal terminals are going to be used to transfer shipments from rail to truck or vice versa, then these terminal locations need to be identified and associated impacts evaluated. Impacts to non-Interstate routes outside Nevada have not been addressed in this document. Alternative/non-Interstate routes need to be analyzed now so that the Yucca Mountain site selection can be evaluated as well as the potential for impacts along these corridors. All types of routes, alternative routes and the modes of transport need to be identified. A thorough analysis of all the potential impacts resulting from these route and mode selections with supporting analysis data needs to be completed. The use of the RADTRAN model for estimation of potential radiological exposures is not appropriate on non-Interstate routes without significant adjustments.

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- This Draft Environmental Impact Statement (DEIS) does not sufficiently discuss the proposed number of shipments, the characteristics of the shipments including their gross

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weights, or the emergency-response characteristics of various routes and their locations. This DEIS fails to provide analysis of the routes to the repository or the potential environmental impacts, costs or risks involved in the transport of these wastes along these corridors. A complete environmental review needs to be conducted with supporting environmental documents and supporting analysis work (i.e., structural and geometric road characteristics, emergency response characteristics, socio-economic impacts) for all proposed and alternative routes. This DEIS needs to be amended to supply the necessary information about specific routes and potential alternative routes or new route construction, the existing route characteristics (geometric and structural), the mitigation needed to upgrade the proposed routes (including costs) to meet the various needs of these High-Level shipments, the emergency preparedness and response characteristics along the transportation corridors, the socio-economic impacts caused by use of these proposed and alternative routes, the risk involved in the transport of HLNW, and the consequences should major accidents occur in transport or at the repository.

28

- Some routes leading to the Nevada Test Site/Yucca Mountain area are heavily traveled tourist and recreational routes. These routes can be greatly impacted by increased truck traffic. Increased truck traffic (especially those hauling nuclear waste) could influence the safety, reliability and congestion characteristics of these routes. Additionally, none of these non-Interstate routes are suitable for the safe and efficient transport of HLNW. None of these routes were designed for heavy trucks, high truck volumes, or quick emergency response.

29

- Caltrans is troubled by the lack of alternatives presented in this DEIS. We strongly urge agencies, organizations and individuals with expertise in nuclear waste disposal to closely examine whether there are no alternative courses of action available to DOE except the use of the Yucca Mountain repository. If alternatives are available, their discussion and evaluation should be presented in this DEIS.

30

- California would be significantly impacted by proposed shipments of HLNW through the state from internal sources, foreign sources, Oregon and Washington to the proposed Yucca Mountain repository. These shipments could have a significant impact on California highways, the involved communities, and the California natural and human environment. Caltrans will need to do a thorough review of any proposal to ship HLNW to determine the infrastructure improvements that will be required as well as the additional costs of maintenance, operations, emergency response, additional personnel, equipment, etc. DOE's support of the following issues will be important and necessary.

**Financial Support** for highway and rail improvements, maintenance and rehabilitation; and for training, equipment, materials, personnel and coordination at least three years before the first shipment to insure the preparedness of involved agencies.

**Training and Planning and Preparedness** sessions for state and local jurisdictions near shipment routes.

**Route Coordination** with state and local jurisdictions, and route identification for each reactor/generator site to the repository at least three years before anticipated shipments.

Review of Accident and Terrorism responses and responsibilities of all involved.

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Coordination and the Supply of Equipment for responses, tracking, record keeping and communications.

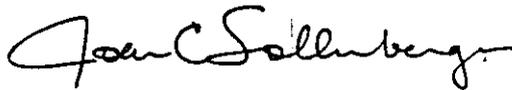
A Prior Commitment for Needs Assessment by state and local agencies for safety improvements, signing, signals, emergency crews, equipment, training, overall route improvements (rehabilitation, reconstruction and improvements).

Formation of a Working Committee of state and local jurisdictions at least five years prior to the first shipment to facilitate coordination, cooperation, communications, and training.

31

- Although the U. S. Department of Transportation and the DOE have had a successful 25-year history of safely transporting and disposing of nuclear waste, close work and cooperation with all agencies involved with this waste management program will better insure another 25 years of success.
- Caltrans will continue to cooperate, communicate, and coordinate with the Department of Energy (DOE), the California Energy Commission, the Western Governors Association, and all agencies and organizations involved in the movement and disposal of nuclear waste.

If you have any questions, please contact me at (916) 653-1818 or Bill Costa at (916) 653-9689.



JOAN C. SOLLENBERGER  
Program Manager

cc: Allan Hendrix

Robert A. Laurie  
Page 4  
January 21, 2000

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**EIS001622**

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# California Regional Water Quality Control Board

## Lahontan Region



Winston H. Hickox  
Secretary for  
Environmental  
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Gray Davis  
Governor

January 10, 2000

EIS001622

Commissioner Robert A. Laurie  
California Energy Commission  
F516 Ninth Street  
Sacramento, CA 95814-5512

Dear Mr. Laurie:

### SUITABILITY OF THE YUCCA MOUNTAIN, NEVADA SITE FOR THE LOCATION OF A HIGH-LEVEL RADIOACTIVE WASTE REPOSITORY

The Lahontan Regional Water Quality Control Board staff appreciates the opportunity to review the Draft *Environmental Impact Statement for a Geologic Repository for the Disposal of High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DEIS). Regional Board staff comments generally are limited to the sections in Chapter 3, *Affected Environment*, and Chapter 4, *Environmental Consequences of Repository Construction, Operation and Monitoring, and Closure* that may have an effect on ground water quality down gradient of the site.

#### General Comments

32 There are many places in the text where qualitative terms such as "relatively little," "a small portion," or "relatively few" are used. These terms are virtually meaningless to a review. If the items described are important enough to discuss in the DEIS at least an estimate of the volumes, percentages, or whatever should be included in the text.

33 Based on the expectation of site-specific, health-based standards for radioactive releases from the repository, the Department of Energy (DoE) is proposing a repository system that is designed to fail, leak radionuclides into the environment, and hope that man-made barriers and the natural environment can dilute the radionuclide concentrations below these health-based limits before reaching the biosphere. However, based on the limited amount of data available, ground water appears to move through the saturated zone from Yucca Mountain to the accessible environment (20-30 km away) in less than the 10,000-year regulatory compliance period.

34 The DEIS summarizes extensive modeling efforts, based on very limited hard data, showing that the 25 millirem/year at 20 kilometers distance from the repository can be achieved. Rather than characterizing Yucca Mountain in terms of its suitability to contain the waste for the prescribed time period, DoE has spent most of their time and energy on the engineering aspects of site

34 continued on page 25

34 development and waste placement. Significant uncertainties remain about the long-term  
 continued performance of each proposed barrier and additional studies are needed to prove that containment  
 can be achieved for the statutory 10,000-year compliance period |

35 More data and, therefore better more realistic models are needed to demonstrate whether  
 radionuclide travel times through the unsaturated zone are sufficiently long to allow the  
 unsaturated zone to serve as a substantive natural component of the repository barrier design. |

Specific Comments

36 §3.1.4.1.2 DoE correctly notes that precipitation is not uniform either spatially or temporarily at  
 the site; e.g., most recharge occurs during the winter months. However, DoE never provides an  
 estimate of the volume of water flux through the mountain nor is enough data available to  
 determine what part of the mountain will be affected by the so-called "fast paths" through the  
 mountain. DoE need to provide information on the water flux through Yucca Mountain and the  
 most probable areas affected by the "fast paths" in the unsaturated zone. |

37 Page 3-35, Table 3-10. The total dissolved solids values listed in the Table only range from 45  
 to 122 mg/L. However, the bicarbonate values alone are listed as ranging from 32 to 340 mg/L.  
 Given the data presented in the table, TDS values should range from 51.5 to 516 mg/L. This  
 discrepancy in the data table needs correction. |

38 §3.1.4.2.1, Page 3-39, 4<sup>th</sup> paragraph. The DEIS states that "the primary ground water discharge  
 points for this [Alkali Flat-Furnace Creek Ranch] sub-basin is Alkali Flat (Franklin Lake Playa)  
 as indicated by the potentiometric surface of the ground water and hydrochemical data. A *small  
 portion* (emphasis added) could move toward discharge points in the Furnace Creek area of  
 Death Valley."

It is not clear, based on previous studies (some of which are not referenced in the DEIS) whether  
 a flow path exists between the volcanic aquifer below Yucca Mountain and the springs  
 emanating from the carbonate aquifer on the east side of Death Valley. What evidence is there to  
 support this assertion and what quantity does DoE consider a "small portion?" |

39 §3.1.4.2.2. It is significant that the character of the pore water from the rock matrix is chemically  
 distinct from water found in fractures. It is also significant that water in the perched zones does  
 not appear to receive a large contribution from the rock matrix; indicating all significant flow,  
 both in terms of volume and velocity, is via fracture flow through the mountain. DoE should  
 estimate at what level of precipitation (infiltration) fracture flow becomes the dominant flow  
 path. |

40 continued on page 26 Table 3-14. Calling the basal vitrophyre and the Tram Tuff confining units seems to be little  
 more than wishful thinking. Apparent hydraulic conductivities up to 40m/yr. in the Tram tuff are

40 not that much different than the underlying carbonate aquifer (“described as a “a regionally  
 continued extensive aquifer system through which large amounts of ground water flow”) displaying a  
 permeability of 69 m/yr. Water percolating through the mountain will take the path of least  
 resistance; therefore, the higher permeability value for the Tram Tuff is probably more indicative  
 of its “typical” permeability.

41 §3.1.4.2.2, Page 3-52. DoE states that “the actual and relative amounts of inflow [into the  
 volcanic aquifers below Yucca Mountain] from each (of the four potential) sources are not  
 known.” This is an essential piece of information necessary for any effective modeling of  
 ground water flow from beneath the mountain and toward Franklin Playa. Any model lacking  
 this information would not provide a meaningful or reliable characterization of ground water  
 flow.

42 §3.1.4.2.2, Page 3-56. The data from Well JF-2a are troublesome. Why would this well exhibit  
 a 27cm increase in elevation when all the other wells in the area exhibit 3- to 9-cm decreases?  
 This apparent contradiction is glossed over in the text and not discussed except to relate the well  
 locations to the proximity of Fortymile Wash. If wells JF-12, JF-13, and JF-3 were not pumped  
 would their static levels also increase? By not providing an explanation of these static water  
 levels, DoE indicates that the hydrogeology below and directly downgradient of Yucca Mountain  
 is poorly understood. More data is necessary to both understand the down gradient  
 hydrogeology and as input to more meaningful ground water modeling.

43 §4.1.3.2 There is some discussion here that water percolating into the repository drifts [if any]  
 would be pumped to the surface. What is the maximum volume of water expected to percolate  
 into the drifts?

44 §4.1.3.2, Page 4-22, 4<sup>th</sup> Paragraph states that 480 to 1,300 liters per year of cleaning solvents  
 (described as “a relatively small quantity”) would be used at the facility. DoE should redistill  
 and reuse as much of these solvents as possible. A release of that magnitude reaching ground  
 water could contaminate between 77,000 to 210,000 acre-feet of water to concentrations above  
 the drinking water standard.

45 Page 5-10, last paragraph. DoE states that water “would drip into the repository but only in a  
*relative few* (emphasis added) places.” What percentage of the repository does DoE estimate will  
 be affected by dripping water?

46 It is amazing that, in a project that is to completely characterize the subsurface in and around  
 Yucca Mountain, there has been no high-resolution geophysical surveys conducted to further  
 delineate the geologic structures below Yucca Mountain that may enhance (of hinder) ground  
 water flow. We recommend that such surveys be conducted as a very cost-effective way of  
 gathering useful subsurface geologic information.

Robert A. Laurie

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In summary, the hydrogeologic and geochemical characterization of Yucca Mountain and vicinity is not complete. Major uncertainties remain about the "fast paths" through the mountain and the flow paths from the underlying volcanic and carbonate aquifers to the alluvial aquifer in Amargosa Valley and possibly on to Death Valley. It is also unclear what effect the Ghost Dance fault (and other faults) east of the proposed facility could have on ground water flow. Currently, the ground water modeling performed on these flow paths, based on little or no information, is little more than conjecture.

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Therefore, as it now stands, the DEIS is deficient, does not contain enough information to determine whether the site is suitable for a high-level radioactive waste repository, and does not contain enough definitive information to make a recommendation to the President. The DEIS should be revised to address these deficiencies before the project can proceed.

Should you have any questions regarding these comments, please telephone the undersigned at (760) 241-7384.

Sincerely,



Tim E. Post, RG, CHG  
Associate Engineering Geologist  
Lahontan Regional Water Quality Control Board



State of California - The Resources Agency

## DEPARTMENT OF FISH AND GAME

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EIS001622

January 10, 2000

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

Dear Mr. Laurie,

The Department of Fish and Game has reviewed the Draft Environmental Impact Statement (DEIS) for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. The Proposed Action addressed in this DEIS is to construct, operate, and monitor, and eventually close a geologic repository at Yucca Mountain in southern Nevada for the disposal of spent nuclear fuel and high-level radioactive waste currently in storage at 72 DOE sites across the United States. The DEIS evaluates (1) projected impacts on the Yucca Mountain environment of the construction, operation and monitoring, and eventual closure of the geologic repository; (2) the potential long-term impacts of repository disposal of spent nuclear fuel and high-level radioactive waste; (3) the potential impacts of transporting these materials nationally and in the State of Nevada; and (4) the potential impacts of not proceeding with the Proposed Action.

The Department is providing comments on this DEIS as the state agency which has the statutory and common law responsibilities with regard to fish and wildlife resources and habitats. California's fish and wildlife resources, including their habitats, are held in trust for the people of the State by the Department (Fish & Game Code section 711.7). The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitats necessary for biologically sustainable populations of those species (Fish & Game Code section 1802). The Department's fish and wildlife management functions are implemented through its administration and enforcement of the Fish and Game Code (Fish & Game Code Section 702). The Department is a trustee agency for fish and wildlife under the California Environmental Quality Act (see CEQA Guidelines, 14 Cal. Code Regs. Sec. 15386(a)). The Department is providing these comments in furtherance of these statutory responsibilities, as well as its common law role as trustee for the public's fish

*Conserving California's Wildlife Since 1870*

28

and wildlife.

49...  
(Go to  
page 37)

The Department commented on the Site Characterization Plan (SCP) on March 23, 1989, and those comments are hereby incorporated by reference. In addition, the *Amargosa nitrophila*, *Nitrophila mohavensis*, a plant species listed as Endangered by both the State of California and U.S. Fish and Wildlife Service, should be included on the list of species contained in the March 23, 1989 letter.

50

The Department is concerned with the impacts of potential transportation routes on desert bighorn sheep. Our greatest concern relates to the potential for further fragmentation of bighorn sheep habitat. Currently, there are no major barriers to movement by bighorn sheep in the area lying north (and west) of Interstate 15 in California, Nevada, Arizona, and Utah, east of California Highway 395 in California, and south of Interstate 80 in Nevada and Utah. This is one of the largest areas within the distribution of desert sheep that has not been fragmented by fenced transportation corridors. The fact that movement corridors for desert sheep have remained relatively intact over time within this geographic area should be considered in the DEIS's evaluation of the impacts of the repository and the resultant potential effects on opportunities for movements by desert sheep. The Department acknowledges that Nevada Highway 95 could be considered to be a barrier, but it is not as disruptive to sheep movements as interstate highways. If the Proposed Action results in the construction of new highways, railroads, or road improvements with new fences, such shipment corridors would pose a barrier to bighorn sheep movements. This example illustrates how the lack of a detailed, comprehensive transportation plan in the DEIS that identifies routes, modes, and impacted populations and environments, prevents adequate evaluation of potential impacts from the Proposed Action. In addition to the physical barriers that the larger highways and fences present, these types of highways also encourage more traffic volume and faster vehicle speeds. The speed and volume of vehicles on the highways is also a major consideration in analyzing impacts to movement corridors by desert sheep. Fragmentation of the habitat within this area, and further barriers to potential movements by desert sheep across California Highway 127, Nevada Highway 95, U.S. Highway 395, as well as secondary roads such as those that run from Pahrump to Las Vegas or from Death Valley Junction to Pahrump, are major causes for concern. With each potential barrier, the long-term conservation of large, mobile mammals becomes more problematic. The DEIS does not contain information regarding proposed transportation routes within California, and does not contain a discussion of the potential for impacts to desert sheep associated with construction or upgrading any of the existing roads. The DEIS is therefore inadequate in its analysis of impacts to desert bighorn sheep. The DEIS should be rewritten to include information designating transportation routes, a description of proposed highway improvements, and an evaluation of these improvements on movement patterns of desert bighorn sheep. Proposed mitigation measures to offset potential impacts to movement patterns of bighorn sheep should also be included. The information contained in the document as written is not adequate to make an informed, rational decision regarding the impacts of the proposed repository on desert bighorn sheep.

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General Inadequacies

51 1. The DEIS lacks a complete and accurate project description. There is no description of transportation of radionuclide waste through California, no environmental consequences evaluation, and no mitigation offered. The DEIS should disclose the potential level of shipments through California, and evaluate potential impacts. In particular, transportation routes could potentially impact habitat for the Amargosa nitrophila, Nitrophila mohavensis, Amargosa vole, Microtus californicus scirpensis, State and Federal Endangered, and desert tortoise, Gopherus agassizii, State and Federal Threatened. The DEIS should include a description of transportation routes, improvements, impacts to these species as well as other State Species of Special Concern, and proposed mitigation measures to offset these impacts. The Department could not find any detailed description of the repository closure including the sealing of shafts and ramps, etc. This element of the project should also be discussed in more detail.

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53 2. There is no evaluation of potential long-term impacts to animals and plants. All the long-term evaluations are based upon human health considerations. The DEIS makes the faulty assumption that relatively few predicted latent cancer fatalities will result in no impacts to aquatic, wildlife, and plant populations dependent upon the water resources affected by the project. These resources have taken tens to hundreds of thousands, and millions of years to adapt to their current habitats. These time scales should be considered in determining potential impacts to these resources. The Environmental Consequences of Long-Term Repository Performance includes three thermal load scenarios for evaluation, but does not incorporate the potential for long-term climate change to radically change the underlying assumptions for the evaluation. For example, a far wetter climate within the next million years could radically alter groundwater movement and waste container disintegration.

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55 3. The apparent level of uncertainty regarding key elements of the project impacts is too high to allow a reasoned decision on the adequacy of the proposed project site. The uncertainty is based either upon a current lack of information, disagreement between experts, or the considerable lengths of time involved in the exposure of the environment to project impacts. The following are examples:

Para. 1, p. 3-50 identifies scientific disagreement regarding groundwater levels. Parties agreed that more research is needed.

Par. 1, p. 3-51 describes uncertainties regarding aquifer conductivity estimates.

Par. 2, p. 3-52 describes unknowns associated with a steep aquifer gradient found, and concludes: "...there are no obvious geologic reasons for the steep gradient, and it is still under investigation."

Last par., p 3-52 explains that the actual and relative amounts of inflow to volcanic aquifers from each source are not known.

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Par. 5, p. 3-53 states that the actual and relative amounts of outflow from volcanic aquifers are not known.

55 continued Par. 4 and 5, p. 5-10 describe the uncertainty that exists regarding the influence of heat on water movement in the unsaturated zone, concluding that there could occur "...much higher seepage rates than this analysis considered in the period after the thermal pulse." More studies are planned by the DOE.

Par. 1, p. 5-13 states that there are differing opinions regarding the mechanisms of release and solubility of specific radionuclides, particularly neptunium-237 which is an important contributor to long-term health effects.

Par. 3, p. 5-13 states that "In the 1-million year period after closure, there could be some changes in dose rates.....that could increase estimated dose rates by an undetermined amount. DOE is planning additional studies..."

Par. 1, p. 5-28 describes the "high degree of uncertainty in the value of the average corrosion rate" of waste packages which could result in package failures occurring within several hundred years to over one million years. A rather wide margin of potential error.

The level of uncertainties involved are exemplified by statements in paragraph 1, p. 5-11 referring to water seepage through walls: "Over time, the number and locations of seeps would increase or decrease, corresponding to increased or decreased infiltration based on changing climate conditions." "Ongoing studies suggest water travels through the unsaturated zone at highly variable rates from less than 100 years to thousands of years."

56 4. The DEIS is not consistent in its evaluation of environmental consequences over long time intervals. It takes current predictions and projects them into the future to be used in the long-term analysis. For example, in the last paragraph p. 5-23 the DEIS concludes that no contamination of the carbonate aquifer is possible because there is currently an apparent hydraulic head of 120 feet in this aquifer forcing water up into the volcanic aquifers, therefore no contamination of surface springs in California would occur. This does not consider the potential for a future change in hydraulic gradients due to climate change, seismicity, etc. over very long periods of time. The potential of surface water contamination from groundwater should be more rigorously evaluated and potential impacts described.

57 continued on page 33 Based upon the considerable unknowns involved with this project, the following can be concluded from this DEIS::

1. The corrosion of waste packages will occur over an unknown amount of time, resulting in the release of unknown amounts of radioactive material into the environment, having unknown consequences.

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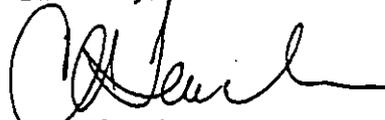
2. The impacts of surface transport of radionuclides through California is unknown.

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Because of the considerable unknowns and uncertainties associated with this project, it appears Yucca Mountain has been selected as the final site for evaluation because either there are less uncertainties and unknowns present here than in other facilities evaluated, or it is thought that there is less risk to resources in this desert area to mitigate the uncertainties associated with this type of project in any locality. The resources in this area of California are no less valuable than those elsewhere. The document contains far too many uncertainties to allow a reasoned decision on the advisability of constructing the project at Yucca Mountain.

Thank you for the opportunity to provide comments on the proposed project. If you have any questions, please call Ms. Denyse Racine, Environmental Specialist, at (760) 872-1158.

Sincerely,



Curt Taucher  
Regional Manager

cc: Ms. Barbara Byron, California Energy Commission  
Ms. Susan Cochrane, DFG, Sacramento  
Mr. Denyse Racine, DFG, Bishop  
Mr. Darrell Wong, DFG, Bishop  
Mr. Vern Bleich, DFG, Bishop



# State Water Resources Control Board



Gray Davis  
Governor

## Division of Clean Water Programs

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Winston H. Hickox  
Secretary for  
Environmental  
Protection

JAN 12 2000

EIS001622

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

Dear Commissioner Laurie:

### REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE PROPOSED YUCCA MOUNTAIN RADIOACTIVE WASTE REPOSITORY, NEVADA

We appreciate the opportunity to review the draft EIS for the proposed Yucca Mountain Radioactive Waste Repository in Nevada. We reviewed Chapters 3, 4, 5, 8, 9, and 10 of the draft EIS with regard to a potential impact of the proposed repository on groundwater quality under the site and down-gradient of the site, specifically in the Amargosa and Death Valleys. Due to time constraints our review of the pertinent references was very superficial and may not have included all information regarding hydrogeological conditions. The final EIS should better characterize regional hydrogeology of the area and address water quality monitoring.

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#### Hydrogeologic Conditions

The draft EIS's risk assessment related to groundwater consumption is based on groundwater migration from the proposed Yucca Mountain repository into the Amargosa and Death Valleys. The draft EIS does contain some information on the regional geology of the Yucca Mountain area. However, the draft EIS does not contain a hydrogeologic cross-section, a basic tool for evaluation of potential impact of contaminants on groundwater. It appears that there is enough information about the area to prepare such a cross-section. Therefore, the EIS should be modified to include: a single, regional, hydrogeological cross section showing the piezometric surface along the potential pathway of groundwater flow; geological formations; the relationships among the volcanic, alluvial and carbonate aquifers; and the outflow locations of carbonate aquifer springs down-gradient from the site. The EIS should also include maps showing water level isocontours. Together, these maps and the cross-section would convey a conceptual model of the site hydrogeologic conditions. Without such maps and cross-sections potential environmental impacts cannot be reasonably assessed.

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The draft EIS appears to contain contradictions regarding which aquifer is present at the actual repository site. For example on page 3-48, the draft EIS states that the saturated zone at Yucca Mountain has three aquifers: upper volcanic, lower volcanic and lower carbonate aquifer. However, the last two sentences of this paragraph indicate that only two aquifers are present as follow: "The lower volcanic aquifer discussed here corresponds to the middle volcanic aquifer shown in Figure 3-15. The lower volcanic aquifer shown in Figure 3-15 has not been identified in the area of the proposed repository"

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61 The upper volcanic aquifer shown in Figure 3-15 does not occur at the site (Topopah Spring Welded Unit - host rock for repository). However, because the upper volcanic aquifer occurs down-gradient of the site, the EIS should address the potential pathway of contaminated plume across different hydrogeologic units, including aquicludes and faults. |

62 We are concerned that the draft EIS characterization of the carbonate aquifer in the vicinity of the Yucca Mountain is insufficient. It appears that only a single well completed in this aquifer was tested. This is not an adequate method to provide reliable data on groundwater flow direction or aquifer hydraulic conductivity. We suggest that more effort should be concentrated on acquisition of field data. These data could enhance the computer-modeling effort. The models try to predict fate and transport of radionuclides 10,000 years into the future. However, without the actual parameters of the aquifer it is difficult to judge the model's reliability. |

63 The risk assessment indicates that Amargosa and Death Valleys are the points of discharge of volcanic and carbonate aquifers into the alluvial aquifer used as a water source by the local population. However, according to some publications (e.g. USGS OFR 83-542) most of the water recharged into Amargosa Valley alluvial aquifer is from snow melt and rainfall from the surrounding mountains. The EIS should provide support for either of these two cases: that the majority of recharge is from surface recharge or that it is from underflow from the volcanic and/or carbonate aquifers. |

### Monitoring

64 The draft EIS does not address monitoring of the unsaturated and saturated zones for a potential migration of radionuclides from the repository. A well-designed, constructed and operated monitoring system is necessary to detect such a migration. The EIS should be modified to describe how groundwater will be monitored, how the monitoring network will be determined, how the unsaturated zone will be monitored and how repository drifts and containers with nuclear waste will be monitored. If such monitoring systems are to be installed, the EIS should describe monitoring device(s) that will be used. |

### Hot Thermal Load vs. Low Thermal Load

65 From our review, it appears that the "hot thermal load alternative" would be more protective for the groundwater under the proposed repository than the proposed "low thermal load alternative", continued as follows. Thermal changes of the surrounding rocks will be probably minimal and limited to onpage 36 the nearest zone around the repository. Benefits from keeping water away from the radioactive materials would greatly exceed any potential benefits from keeping rocks cooler. It would also retard any potential penetration of water into the repository. In contrast, the "low thermal load alternative" appears to be more risky and more labor extensive, to cause more environmental

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Commissioner Robert A. Laurie

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EIS001622

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disturbances, and to increase a chance of fault(s) and fractures interception by repository drifts. The alternative should be chosen based on data available from the ongoing thermal drift scale test. |

If you have any questions concerning our review, please call Jan Stepek at (916) 227-4363.

Sincerely,



Edward C. Anton, Chief  
Division of Clean Water Programs

cc: Ms. Barbara Byron  
California Energy Commission  
1516 Ninth Street, M.S. 36  
Sacramento, CA 95814-5512

Mr. Harold J. Singer, Executive Officer  
Lahontan Regional Water Quality Control Board  
2501 Lake Tahoe Blvd.  
South Lake Tahoe, CA 96150

Mr. Tim Post  
Lahontan Regional Water Quality Control Board  
Victorville Branch Office  
15428 Civic Drive, Suite 100  
Victorville, CA 92392-2383

I-42032

Memorandum

EIS001622

To : Ms. Barbara Byron
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Date : March 23, 1989

NNA.890518.0216

From : Department of Fish and Game

Subject : U. S. Department of Energy - Yucca Mountain Site Characterization Plan

49...

The Department of Fish and Game has reviewed the U. S. Department of Energy's Site Characterization Plan (SCP) for the proposed Yucca Mountain, Nevada, high-level nuclear waste repository. The SCP describes the detailed studies that will be performed to determine the suitability of the site for nuclear waste disposal, and the potential environmental impacts of construction and operation of the repository. The Department is interested in the SCP because of potential impacts the waste repository could have on water supplies for California fish and wildlife populations in and near Death Valley National Monument.

The Death Valley area is one of the most arid regions in North America. Perennial water supplies in the region are available only where groundwater surfaces in springs or short reaches of streams. Many fish and wildlife species are totally dependent on the unique habitats that these isolated water supplies provide. Some of these species occur nowhere else on earth. The Department is particularly interested in the following species:

- Amargosa pupfish
Saratoga Springs pupfish
Salt Creek pupfish
Cottonball Marsh pupfish
Shoshone pupfish
Amargosa vole
Saratoga Springs Belostoman bug
Cyprinodon nevadensis amargosae
Cyprinodon nevadensis nevadensis
Cyprinodon nevadensis salinus
Cyprinodon salinus milleri
Cyprinodon nevadensis shoshone
Microtus californicus scirpensis
Belostoma saratoga

In addition, two as yet unclassified forms of Amargosa speckled dace (Rhinichthys osculus ssp.) occur in the area, and some endemic snail species have recently been discovered in the area as well. Of these species, the Amargosa vole is both State- and Federally-listed as endangered, and the Cottonball Marsh pupfish is listed by the State as threatened. Other species may well qualify for listing in the future, when more is known about them.

Ms. Barbara Byron

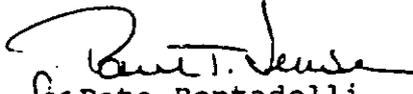
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March 23, 1989

...49 Because these species are totally dependent on surfacing groundwater, the Department is concerned about any effects the waste repository may have on groundwater flows and groundwater supplies. The SCP indicates that the groundwater that supplies the springs and streams in California originates from recharge areas in Nevada. These groundwaters flow underground, past the Yucca Mountain disposal site, and then to California in a slow, complicated underground path that the SCP indicates is not well understood. If the construction or operation of the waste repository interrupts or depletes these groundwater flows, water supplies for the many fish and wildlife species listed above, and other plant and animal species as well, could be reduced or cut off. Because some of these species occur nowhere else on earth, this could cause the extinction of several fish and wildlife species.

The Department believes that the U. S. Department of Energy should perform the necessary studies to determine if the project will reduce or cut off groundwater flows to California. The Department notes that the SCP describes several planned studies that relate to groundwater. However, the SCP does not include a study element specifically aimed at addressing potential project effects on fish and wildlife populations dependent on groundwater supplies. The Department recommends that such a study element be added to the SCP as a separate and significant part of the overall study plan. Furthermore, the Department recommends that if this study determines that impacts on California's fish and wildlife populations could occur, the U. S. Department of Energy should implement alternative project features or modifications, or develop adequate mitigation measures, so that these impacts do not occur.

Thank you for this opportunity to comment on the SCP. If you have any questions about the Department's comments, please contact Pete Phillips at (916) 322-4891.

  
Pete Bontadelli  
Director