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

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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.

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.

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.

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.

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

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

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.

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.

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

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

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.

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 NWPA 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.

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

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.

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

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

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.

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[1] 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;

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[1] 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.

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

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.

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 Toxics Substance 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

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

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

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

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.