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STATE OF CALIFORNIA COMMENTS 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

January 27, 2000

The State of California has reviewed the Department of Energy's (DOE) Draft EIS 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. These California agencies are: the State of California Departments of Conservation, Fish and Game, Health Services, Parks and Recreation, Toxic Substances Control, Transportation, Water Resources, Energy Commission, Emergency Services, Highway Patrol, the Lahontan Regional Water Quality Control Board, Public Utilities Commission, and Water Resources Control Board. Our comments on the DEIS focus primarily on three areas that most directly impact the State of California:

- Transportation impacts
- The potential groundwater impacts in the Death Valley region
- Impacts on wildlife, natural habitat and public parks

Our more detailed comments on the DEIS are attached and were prepared by the California Departments of Parks and Recreation, the Lahontan Regional Water Quality Control Board, Water Resources Control Board, Fish and Game, Transportation, and Conservation.

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 the National Environmental Policy Act (NEPA) by failing to: (1) provide a complete and accurate project description, including full disclosure of potential transportation impacts, and, (2) provide adequate notice of public hearings.

1. Failure to Provide a Complete and Accurate Project Description.

The DEIS should give a complete description and analysis of the proposed project including transport routes and modes, number and characteristics of shipments, and a route-specific analysis of potentially impacted populations and environment from these shipments.

The DEIS does not meet the requirements of NEPA because it fails to adequately describe the project. The DEIS' analysis of the transportation risks associated with

transporting 70,000 metric tons of radioactive waste from 77 individual sites to a repository 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 offered for these impacts.

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. Detailed consideration of transportation impacts must not be deferred to future environmental impact assessments.

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. Because of the large number of nuclear reactors, the lengthy transportation routes, and large urbanized and rural areas in California that will be impacted by these shipments, the DEIS should provide full disclosure of the transportation impacts. This should include a route and mode-specific assessment of accident risk to the public, environment, as well as public use areas and the costs to states, tribes and local communities in preparing for these shipments.

2. Inadequacy of Public Notice of Hearings.

The noticing 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 transportation 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. The DEIS omits detailed information on transport routes, transport modes, and the frequency and numbers of shipments. By omitting this information and analysis, members of the public have no way of knowing whether the proposed repository may impact them. Such an omission suppresses public interest in the project and participation in the public hearings. Nevada officials, and not DOE, continue to be the primary source of information regarding information on estimated numbers of shipments, routes, and impacts on states and local communities. The DEIS should provide this information and detailed analyses of impacts to states, tribes, and communities impacted by these shipments.

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, at a remote location in Lone Pine, and this hearing was held only at the specific request of Inyo County. The notices for the public hearing 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. Absent routing information, people affected by the transportation impacts of the proposed action have no way of determining the sufficiency of the DEIS analysis of impacts.

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, including those in California. It is essential that a full analysis be made of the ramifications and impacts of each transportation alternative.

The massive scale of radioactive waste shipments to the proposed repository will be unprecedented. Total annual shipments of these wastes are projected to increase from the current 15 to 25 rail shipments per year to between 400 to 600 rail shipments per year within the next decade (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 would be an average of five truck shipment 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.

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.

1. **DOE continues to ignore long-standing western states' priorities and public official requests to develop a comprehensive transportation program for nuclear waste shipments to the proposed repository.**

California and other Western States, acting through the Western Governors' Association and the Western Interstate Energy Board since 1985, 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) DOE thoroughly

evaluate terrorism and sabotage concerns. The Western Governors' Resolution 9-014 clearly states the need for DOE to develop a comprehensive transportation plan for these shipments. DOE's progress in all of these areas, as demonstrated in the DEIS for the Yucca Mountain project, continues to be poor and unresponsive to states' concerns. The State of California strongly recommends that the EIS should include a full and detailed discussion of DOE's transportation program for shipments to the Yucca Mountain site, using the successful WIPP Transport Safety Program as a model.

With State and tribal input, DOE should develop highway and rail routing policies, perform an integrated route and modal analysis that identifies and describes DOE's modal choice and routes, state their intentions regarding full-scale cask testing, and develop policies on providing technical and financial assistance to states, tribes and local jurisdictions in compliance with requirements of the federal Nuclear Waste Policy Act (NWPA) Section 180 (c).

In contrast to DOE's poorly developed transport program for NWPA shipments is DOE's relatively successful Waste Isolation Pilot Plant (WIPP) transportation program. The WIPP program represents a positive example of states and DOE working together over several years to develop a comprehensive transportation program that is acceptable to states and DOE alike. WIPP transport routes 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 and in identifying shipment routes and modes.

2. DOE should identify and analyze transport routes for shipments to the proposed repository.

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 and ignores long-standing state requests made through the Western Governors Association for DOE to identify and analyze these routes and modes. 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, the DEIS fails to meet this commitment and provides no route-specific or transport mode-specific analyses and no evaluation of the impacts on states along transportation corridors. 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).

3. California agencies have expressed concern over DOE's possible routing spent fuel shipments to the repository using California roads that were not engineered for heavy truck traffic.

California agencies have expressed concern over the possibility that DOE may decide to route a major portion of these Yucca Mountain shipments through California along roads not designed for heavy truck traffic. This concern was heightened recently when DOE announced their decision to reroute through southern California, including along 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 SR-127 and the surrounding areas as a result of this additional heavy truck traffic. 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 70,000 tons of Yucca Mountain spent fuel shipments would hasten the deterioration process.

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. 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 numerous unbanked, unsigned high-speed turns, blind rises where visibility is nil, sustained grades in excess of modern standards, 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 this route are also of concern. Many of the towns along SR-127 are served by a single volunteer fire department that has no funding. Federal regulation under the NWPA, Section 180 (c) requires improved responder training and response capability for routes used to transport spent nuclear fuel and high-level nuclear waste. At present there are few California Highway Patrol officers or other first responder personnel along SR-127 as well as a lack of emergency response equipment. There are a total of four access roads on the entire SR-127, and two of those roads are paved but undivided. In the event of an emergency, responder personnel and equipment would be extremely delayed in arrival at an accident scene. Further, 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. Therefore, the scarcity of emergency response resources along this route 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.

4. DOE, and not carriers, should select spent nuclear fuel/high-level waste shipment corridors to allow states and tribes to focus training and emergency response preparation on these corridors.

As a representative from the Western Interstate Energy Board's High-Level Radioactive Waste Group recently testified on November 16, 1999, before DOE 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• 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; and (2) provide states and communities sufficient time to prepare for shipments by identifying national routes well before shipments begin.

Private carriers should not be given the responsibility of evaluating and selecting routes. DOE should identify the preferred corridors and the required roadway and emergency response improvements identified. DOE has the successful Wastes Isolation Pilot Plant (WIPP) transportation program to use as a model for the route selection process. A preliminary set of WIPP shipment routes was proposed to the affected states and then modified on the basis of state and local input for primary and alternate routes. DOE then selected routes in consultation with states and tribal governments and mandated use of these routes by carriers. This process allowed for concentrating emergency response resources along these selected routes.

5. DOE should analyze and select the transport modes for shipments to the repository, including identifying intermodal (rail to truck transfer locations or

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•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

vise versa) options and locations. Modal selection should be optimized for each generator site to minimize public health and safety impacts.

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, or 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 either one is unlikely 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. The numbers and routes of rail shipment need to be identified in the DEIS, as well as the estimated costs to states for rail safety inspections. (CHECK WITH ERNIE VON IBSCH ON THIS SECTION)

6. 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.

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.

When the proposed routes are identified in California, a complete environmental review is needed of these routes and their alternatives, with supporting environmental impact analysis. 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 and habitat impacts, as well as risks to human populations along these routes. In addition, the EIS should identify road and rail improvements needed, including estimated costs for these upgrades and emergency

response preparation.

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 depending upon its age and burn-up levels, and the role human error may play in manufacturing, quality control and operation of the casks. The EIS should also evaluate the potential impacts from a sabotage or terrorist threat against a shipment. The large projected increase in the numbers and operational complexity of spent fuel shipments to the proposed repository at Yucca Mountain, 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' evaluation of potential transportation impacts.

In accordance with the requirements of the Clean Air Act, NEPA and the California Environmental Quality Act, future EIS analyses should include detailed site-specific routing information and analysis. 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 and address the social and economic impacts to state and local governments from road and rail improvements or maintenance as the result of these shipments. 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. The DEIS should include the estimated costs and responsibility for any necessary highway and rail improvements, maintenance, as well as emergency response training and equipment.

The 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, the isolated nature and current configuration of some of these roadways, would make compliance with 180(c) costly to complete. The DEIS does not provide estimates of the resources needed to meet its obligations under 180(c). Excessive numbers of shipments by heavy trucks on SR-127 would require complete reconstruction of some sections of the roadway. The State and local communities along the route would be burdened by significant new costs to protect its residents. The DEIS should identify the significant fiscal impacts of meeting these obligations. In addition, DOE should commit to working with the state and local jurisdictions allowing sufficient time prior to the first shipment to develop transport and emergency response plans, training, and exercises.

7. Activities in California associated with the Yucca Mountain Project must comply with hazardous waste management requirements, including permitting

requirements.

The EIS should recognize that activities related to the proposed project require hazardous material permits. The State of California through its Department of Toxics Substance Control is required to comply with the provisions of the California Environmental Quality Act (CEQA) in evaluating potential impacts associated with the issuance of individual RCRA or non-RCRA permits for activities in California associated with the Yucca Mountain Project. Toxics Substances Control is authorized to regulate RCRA and non-RCRA standards that apply to any activity that generates, transports, treats, stores or disposes of hazardous waste. Treatment of hazardous waste generated from commercial nuclear facilities that do not meet the RCRA definition, but do meet the California-only waste non-RCRA) definition, would require a non-RCRA permit or authorization of DTSC for each site. The DEIS should state that DOE will comply with all permit requirements for these activities.

WATER QUALITY IMPACTS

1. **The DEIS should more fully evaluate potential pathways for radionuclides reaching regional groundwater supplies in eastern California, such as in the Death Valley region, and analyze potential water quality 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 southeast to become surface water flowing into Death Valley that is used for commercial and domestic purposes and supports natural habitats. The EIS should evaluate these studies and include them in their analysis of the potential migration of radionuclide contaminants to regional groundwater supplies.

2. The DEIS should better characterize regional hydrology in the Armargosa and DeathValley areas. Better data and more realistic models are needed to evaluate groundwater flow and radionuclide contaminant migration toward aquifers in California.

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 ground water toward California. The significant issue is, what is the relation between ground water conditions beneath Yucca Mountain and ground/surface water in California? The source of water at Furnace Creek in California is not well known. It is either 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 designed 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, 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. 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 prove that containment can be achieved for the statutorily required 10,000-year compliance period. Regarding the potential impact of the proposed repository on groundwater quality in California, specifically in the Amargosa and Death Valleys, the final EIS should better characterize regional hydrogeology of the area.

3. The DEIS should include a hydrogeologic cross-section and maps showing water level isocontours to evaluate potential environmental impacts to groundwater in California

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.

4. The DEIS should describe how the saturated and unsaturated zones will be monitored to detect migration of radionuclides from the repository.

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 containers with nuclear waste will be monitored.

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

The "Hot 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.

6. The level of uncertainty regarding the proposed project's impacts is too high to support a reasonable decision on the adequacy of the Yucca Mountain site.

The level of uncertainty regarding key elements of the project's 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 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 amount of inflow to and outflow from volcanic aquifers from each source are not known; (3) the influence of heat on water movement in the unsaturated zone is unknown with the result that much higher seepage rates could occur into the repository than this analysis considered, (4) differing opinions regarding the release and solubility of major radionuclides, (5) high degree of uncertainty in 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 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.

IMPACTS ON WILDLIFE, NATURAL HABITAT AND PUBLIC PARKS

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

The DEIS should include as part of its description and analysis of transportation routes and modes, the potential impacts to wildlife, natural habitat and public use parks, 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 the 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.

The California State Park system includes 265 park units encompassing 1.4 million acres within which the State is responsible for preserving these extraordinary natural and cultural resources and biological diversity. 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.

CONCLUSION

California is very concerned that a complete and adequate EIS be prepared for the proposed repository at Yucca Mountain that presents a comprehensive review of the proposed action and potential impacts upon which well-informed decisions can be based. Following our review, it is our conclusion that the DEIS is seriously inadequate, fundamentally flawed and incomplete because it does not:

- fully disclose the transportation impacts from the proposed project;
- identify and analyze primary, secondary and emergency shipment routes and transport modes for the nuclear waste shipments to the proposed repository;
- identify potential impacts to populations and the environment along shipment corridors, and;
- provide adequate public notice of the significant transportation impacts from the proposed project.

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