

## **PART THREE SPECIFIC COMMENTS**

### **SECTION 1. PURPOSE AND NEED FOR AGENCY ACTION**

Page 1-1; Section 1 - Purpose and Need for Agency Action

The original intent of the NWPAs was the permanent disposal of nuclear waste. DOE has ignored this intent and, instead, has focused on delaying releases from the repository so that future generations must shoulder the burden of and be affected by the resulting contamination. The Yucca Mountain project, as depicted in this Draft EIS, does nothing but target future generations for radionuclide contamination.

The Draft EIS states that “DOE has ultimate management responsibility for other highly radioactive materials. Examples of such materials include Greater-Than Class-C and Special-Performance-Assessment-Required wastes. The Department might need to dispose of these materials in a monitored geologic repository to protect public health and safety. However, disposal of Greater-Than Class-C and Special-Performance-Assessment-Required wastes at the proposed Yucca Mountain Repository could require additional legislative action or a determination by the U.S. Nuclear Regulatory Commission to classify them as high-level radioactive waste.”

The State of Nevada contends that DOE has not developed a “path forward” for the disposition of commercial Greater-Than Class-C (GTCC) waste and/or DOE owned Special-Performance-Assessment-Required wastes. DOE must acknowledge that the Waste Management Programmatic Environmental Impact Statement (DOE/EIS-0200-F) did not address bounding alternatives for the disposition of these waste types. Because of the long-lived radiation hazards associated with these waste types, the Draft EIS should have acknowledged that these wastes must be confined from the biosphere for the indefinite future. In other words, shallow land burial is not an option for final disposition of these wastes. Rather than provide a largely speculative discussion about what might be needed to resolve the “path forward” disposal options, the Final EIS must acknowledge that DOE has yet to postulate a preferred disposal option for these wastes.

Page 1-3; Section 1.1 - Potential Actions and Decisions Regarding the Proposed Repository

The text states that the Draft EIS analyzes potential impacts of transporting SNF and HLW to Yucca Mountain from 77 sites across the United States. However, nowhere in the Draft EIS is there a description of the routes that were analyzed or maps that show specific highways and rail lines. This omission is a major deficiency in the document -

one that, by itself, provides legal basis for the Draft EIS to be withdrawn and reissued for public comment with transportation routes clearly identified and route specific analyses articulated and evaluated. It is impossible for the public located along potential routes to participate in the NEPA process when critical information regarding the nature and location of potential impacts is hidden or withheld.

The text states that “the EIS provides the information necessary to make decisions regarding basic approaches [to waste transportation] (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors.” The content of the Draft EIS does not substantiate this statement. In fact, given the overtly generic manner in which information is analyzed and presented, it will be necessary for DOE, at a minimum, to prepare a separate EIS that addresses impacts associated with transportation modes and route alternatives.

Nevada also contends that, contrary to the assertion in Section 1.1, future decisions such as the selection of specific rail alignments or specific locations of an intermodal transfer facility will require more than just additional field surveys, consultations, engineering and environmental analyses, and NEPA reviews. The information contained in the Draft EIS is not even sufficient to support the selection of a specific corridor for construction of a rail spur to Yucca Mountain. Such a decision must be supported by a separate EIS that adequately evaluates alternatives, including information about specific rail alignments. Nevada further contends that selection of a location for an intermodal transfer facility must also be supported by a separate EIS, not just supplementation of the inadequate and incomplete generic analyses contained in this Draft EIS.

Apparently, DOE has chosen to limit the National Environmental Policy Act decision process for the Draft EIS by postponing specific decisions on transportation modes and routes and disposition of waste volumes greater than 70,000 metric tons. Given this situation, the Draft EIS must provide additional detail about how the NEPA process will be followed to make forthcoming “repository related” decisions. Specifically, the discussion in the Draft EIS on page 1-21 (Environmental Impact Analysis Process) must be expanded to include how NEPA tiering requirements (40 CFR 1808.28) will be addressed for assessing connected actions and decisions.

DOE has not demonstrated the technical, economic, or environmentally acceptable feasibility of transporting spent nuclear fuel and high-level radioactive waste to the proposed site. Absent this demonstration, DOE violates the National Environmental Policy Act by deferring the transportation related decisions. Specifically, if the proposed repository is approved based upon this EIS, DOE will begin to make a substantial commitment of resources to the proposed repository, even though the method of transportation to the site has not been determined. This could result in forcing a

transportation related decision that results in unacceptable, adverse impacts. This is the scenario that the NEPA process is designed to avoid.

This section must also include a discussion about the need for and/or option to use NEPA supplemental environmental impacts statements to address forthcoming repository related decisions (as per 10 CFR 102.314). State officials contend that DOE will receive substantial public comment on the Draft EIS about the lack of NEPA analysis to support the selection of transportation modes and routes. DOE must advise readers that supplemental EIS documents will be prepared if DOE determines that the purpose of NEPA will be furthered by doing so (40 CFR 1502.9(c)(2)). This section should also note that DOE is required to prepare a supplemental EIS if there are substantial changes in the Proposed Action that are relevant to environmental concerns, or if there are significant new circumstances or information about environmental concerns that would affect the Proposed Action or its impacts (40 CFR 1502.9 (c)).

#### Page 1-7; Section 1.2.3 - High-Level Radioactive Waste

The Draft EIS indicates that liquid HLW will be vitrified, poured into canisters, and allowed to solidify prior to transport to Yucca Mountain for final disposal. The Draft EIS gives the impression that this vitrification process is readily available and easily applied to the waste forms currently existing at DOE facilities. The Draft EIS fails to address the substantial problems that have plagued DOE's waste vitrification program and the implications of potential failure to make vitrification possible and/or practical at various DOE generator locations. Operational failure of the vitrification process will have significant implications for worker health and safety, transportation risks, surface facility operations at Yucca Mountain, and long term repository performance.

#### Page 1-8; Section 1.2.5 - Other Waste Types with High Radionuclide Content

The Draft EIS fails to articulate an adequate legal rationale supporting the inclusion of wastes other than spent nuclear fuel and high-level radioactive waste as defined in the Nuclear Waste Policy act of 1982, as amended. Particularly, there does not appear to be any legal justification for the inclusion of "Special-Performance-Assessment-Required" waste referred to in Section 1.2.5.

#### Page 1-9; Section 1.3.2 - Nuclear Waste Policy Act

The discussion of the Nuclear Waste Policy Act contained in this section presents a distorted and revisionist picture of the process that led to the 1987 amendments. The discussion fails to address the serious problems with DOE's implementation of the original Act, congressional investigations that found DOE deficient in its handling of the

program, the level of controversy surrounding the program, the highly charged political environment that led to the 1987 amendments, and the purely political criteria that were used to single out Yucca Mountain as the only site to be studied. This information provides essential context for evaluating and understanding impacts associated with the program as it exists today.

Page 1-13; Section 1.3.2.4 - Environmental Protection and Approval Standards for the Yucca Mountain Site

While the Yucca Mountain Draft EIS is not intended as a site suitability document, it must nevertheless address the site's ability to meet established health, safety, and environmental standards. The performance of the site in relation to such standards is, itself, a measure of impact on the physical and human environment. The final EIS must evaluate Yucca Mountain against the proposed Environmental Protection Agency radiation protection standards and must demonstrate that the Yucca Mountain site can meet the 15 millirem annual release standard and the 4 millirem groundwater protection standard. Failure to meet these EPA standards would constitute a significant project impact and would lead to the disqualification of Yucca Mountain as a candidate site.

Page 1-16; Figure 1-6 - Land Withdrawal Area Used for Analytical Purposes

The expanded map is not correct. The locations of the Lathrop Wells Road, its intersection with Highway 95, and Amargosa Valley are incorrect. The Lathrop Wells road exits the southern boundary of Area 25 of the Nevada Test Site and proceeds south to Highway 95, just west of the intersection with State Road 373 at Amargosa Valley.

Page 1-17; Section 1.4.2 - Proposed Disposal Approach

The third sentence of the first full paragraph indicates that "(t)he waste packages would be moved underground by rail." This is also described elsewhere in the document (Section 2.1.2.2.1 Subsurface Facility Design and Construction, Page 2-27 through 2-31). However, nowhere does the Draft EIS indicate what level of inspection will be performed on the rail/trolley system, as well as other infrastructure in place at the site. Inasmuch as a transportation or emplacement related accident at the site could have catastrophic and long-term impacts to Nevada, quality control, inspection by qualified outside expertise, and a comprehensive maintenance and inspection program for the transportation activities and infrastructure within the site are critical to program safety. The Draft EIS fails to address this important component of long-term site safety.

DOE can contract for such services from the private sector, utilize existing contractors, hire DOE expertise in these areas, or provide resources so that other State or federal

agencies conduct inspections. Additional resources for affected federal or state agencies would need to be quantified and funded accordingly.

Page 1-20; Section 1.4.3.3 - Site Recommendation

The terms used in Sec. 114(a) of the Nuclear Waste Policy Act should be used in describing the requirements for recommending the site:

Bullet 2 - "waste form" not "material forms"; and "form" not "forms";

Bullet 5 - "waste form" not "material form"; and "analysis seem to be sufficient" not "are sufficient"

Page 1-21; Section 1.4.3.4 - No-Action Alternative

This section states "DOE recognizes that neither scenario would be likely if there were a decision not to develop a repository at Yucca Mountain; however, they are part of the EIS analysis to provide a baseline for comparison to the Proposed Action."

The two scenarios are so irresponsible as to make them impossible. The nature of the hazard of spent nuclear fuel is such that it would never be permitted remain at reactor sites without active institutional controls. There is no basis to assume that active institutional controls could be implemented for 10,000 years. This is pure speculation, substantiated by the statement in Section 2.2, No-Action Alternative (page 2-59): "Under any future course that would include continued storage, both commercial and DOE sites would have an obligation to continue managing spent nuclear fuel and high-level radioactive waste in a manner that protected public health and safety and the environment."

The fact that neither of the No-Action Alternative scenarios would be permitted or implemented dictates that these are not reasonable alternatives. NEPA regulations require that alternatives to the Proposed Action be reasonable (Sec. 1502.14). Therefore, the Draft EIS No-Action Alternative is not in compliance with NEPA regulations, and the Draft EIS is insufficient in this selection of No-Action Alternative scenarios.

The Draft EIS, on page 2-1 states, "DOE does not intend to represent the No-Action Alternative as a viable long-term solution but rather to use it as a baseline against which the Proposed Action can be compared." Comparing the impacts of unreasonable alternatives to impacts of the Proposed Action is meaningless and serves no purpose in the analysis of impacts of the Proposed Action.

While the NWPA exempts DOE from the need to evaluate alternatives to the Yucca Mountain site and to geologic disposal, it does not exempt DOE from evaluating a reasonable No-Action Alternative that represents the situation without a Yucca Mountain repository. The No-Action Alternative selected for analysis by DOE postulate scenarios where spent fuel and HLW are left on-site at generator locations for 10,000 years. Such scenarios are entirely unrealistic. The Draft EIS must be rewritten using a No-Action Alternative that realistically depicts the future in the event DOE is required to abandon the Yucca Mountain project. The NWPA, as amended, specifically directs DOE to report back to Congress for instructions on how to proceed in such an event. It is entirely unrealistic - even absurd - to believe that Congress would direct DOE to store waste at generator sites for 10,000 years. The No-Action scenarios contained in the Draft EIS appear to have been chosen for their political value to alarm the nation and to pressure Congress and the Administration to stay the course with Yucca Mountain in spite of the many serious flaws within the current program.

#### Page 1-21; Section 1.5 - Environmental Impact Analysis Process

This gives an overly broad view of NEPA that focuses on procedure and avoids the intent, purpose, substance, and spirit of the Act. There is no indication of the guidance followed in the course of conducting Environmental Impact Assessment or for preparing the Draft EIS. New guidelines and techniques for improving the NEPA process (e.g., Salk and others, 1998; Caldwell, 1998; Clark and Canter, 1997; Ortolano, 1997; Gilpin, 1997; Weisner, 1995; Bartlett and Malone, 1993) appear not to have been used in this case. Moreover, significant substantive issues raised prior to the release of this Draft EIS and contained in Attachments A, B, C, D, E, F, G, and H have not been addressed.

#### Page 1-21; Section 1.5.1 - Notice of Intent and Scoping Meetings

The State of Nevada reiterates its objection to the manner in which the scoping process for the Draft EIS was handled, both in Nevada and elsewhere. In comments on the proposed scope of the Yucca Mountain EIS in 1995, the State found that the notices of the scoping meetings did not adequately describe the Proposed Action and its implications for people along transportation routes. DOE failed to indicate the true national scope of the high-level waste program and deliberately chose not to make people aware of the potential transportation routes through their communities - and the consequent risks from spent nuclear fuel (SNF) and HLW shipments - as part of the notices for scoping meetings. Failure to adequately inform potentially affected citizens of possible consequences of the Proposed Action for their communities created a situation where public participation in the EIS scoping process was suppressed, as evidenced by the poor turnout at most of the EIS scoping meetings. In effect, DOE disenfranchised people throughout the country who stand to be substantially affected by the proposed

repository program and who were not afforded adequate opportunity to participate in the initiation of the NEPA process.

In addition to DOE's failure to adequately notice the scoping Draft EIS hearings, the information contained in the original Notice of Intent (NOI) and DOE's informational presentations at the beginning of each scoping meeting misrepresented and, in certain instances, distorted the Yucca Mountain program and its possible impacts. For example, no information was provided on the possible unfavorable conditions present at the Yucca Mountain site. The implementation alternatives contained in the NOI failed to include any discussion of the relationship between thermal load, the space required for waste emplacement, and the capacity constraints at the Yucca Mountain site. Inadequate information was provided on the relationship between regional (i.e., Nevada-specific) and national transportation impacts and analyses, and misleading information was provided regarding transportation regulations, waste volumes required to be transported, and the possible modes and routes for SNF and HLW transportation.

The inadequate meeting announcements and the incomplete information presented led to a recommendation by the State that DOE extend the scoping period and initiate new scoping meetings. DOE rejected the State's recommendation and proceeded with development of the Draft EIS.

The fact that the repository project description "evolved" significantly from the time of the scoping meetings in 1995 to the issuance of the Draft EIS in August 1999 created a situation wherein the "project" that was presented in scoping materials and hearings is now unrecognizable in the Draft EIS. The conceptual design for the repository in 1995 relied primarily on the geologic environment for waste isolation, while the "evolved" design of this Draft EIS places primary waste containment emphasis on engineered barriers, with little or no credit taken for the isolation capabilities of the Yucca Mountain geology. In addition, the three thermal load scenarios specified in the 1995 scoping materials and carried forward into the Draft EIS no longer reflect the thermal conditions postulated for the current preferred repository design.

For all these reasons, the original scoping process and scoping meetings should be considered inadequate as well as irrelevant to the current state of the proposed repository program. DOE should be required to re-scope the project and reissue the Draft EIS using the information obtained from the new public scoping process, as required under NEPA.

Page 1-23; Section 1.5.1.1 - Additional Inventory Studies

The Nuclear Waste Policy Act limits the amount of spent nuclear fuel that can be disposed in a Yucca Mountain repository. In addition, the Act does not authorize

disposal of Greater-Than-Class-C or Special-Performance-Assessment-Required waste in a Yucca Mountain repository.

Page 1-24; Section 1.5.3 - Relationship to Other Environmental Documents

This section includes the 1996 Final EIS for the Nevada Test Site (NTS) but does not mention the important DOE-NTS Resources Management Plan that should have been used as the model for the Yucca Mountain environmental assessment. This issue, essentially involving the use of ecosystem management, is further discussed in Attachments F, G, H, I, J, K, and L.

Page 1-26; Section 1.5.3 - Relationship to Other Environmental Documents

*Table 1-1 - Draft EIS, Idaho High-Level Waste and Facilities Disposition*

The 1995 Idaho/DOE Settlement Agreement (USDC) schedules conversion of all sodium-bearing HLW liquid waste in the INTEC Tank Farm into calcine by 2012 and mandates removal of all calcined HLW by 2035. DOE now estimates that treatment will be completed and waste will be “ready for removal” from the Idaho National Environmental and Engineering Laboratory (INEEL) by 2035, but does not guarantee the waste will actually be removed by that date.

The State of Idaho maintains that sodium bearing tank waste is HLW and cites the DOE Order 435.1 definition of high-level waste as “liquid produced directly in reprocessing.” Using this definition, the State identifies both sodium bearing and non-sodium bearing waste as HLW. The State of Idaho also includes in its HLW definition liquids from the second and third extraction cycles that were routed to an evaporator before being sent to the Tank Farm and states that “as such, these liquids contain radioactive fission products in sufficient concentrations to warrant permanent isolation in a geologic repository.” (DOE says only the liquid from the first reprocessing cycle is HLW.) Idaho contends that DOE should manage the sodium-bearing waste as HLW unless and until a “Waste Incidental to Reprocessing” determination is made in which the referenced HLW waste would be classified and managed as either TRU or low-level waste.

If Idaho’s definition of HLW holds up, volume estimates for HLW from INEEL to Yucca Mountain could change substantially and would put pressure on DOE’s 4,667 MTHM volume commitment for HLW in Yucca Mountain.

Idaho has also formally recommended that DOE allow disposal of HLW containing hazardous waste constituents at Yucca Mountain. If INEEL prevails, other sites would



also be in line to ship such wastes to Yucca Mountain, and volume and waste type estimates, as well as the regulatory oversight scenario, would be significantly altered.

Idaho is also challenging DOE's method for calculating Metric Ton Heavy Metal for HLW because it does not accurately reflect actual concentrations of radionuclides and relative risk, i.e., DOE's standard says one canister of HLW = 0.5 MTHM. Idaho says this calculation does not recognize the fact that much of DOE's waste is less radioactive than "typical" waste used in the comparison. Idaho says DOE has overestimated the HLW MTHMs, exceeding the amount allowed in the repository. Idaho further contends that, if other methods of calculating MTHM were used, DOE could stay well within the capacity set for Yucca Mountain and allow INEEL to send larger quantities of its waste to Nevada.

Because waste volumes and types are so central to understanding the entire range of impacts associated with a Yucca Mountain repository, the Draft EIS should have fully evaluated these issues.

*Final Waste Management PEIS for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste (Waste Management PEIS) (DOE 1997b)*

This document characterizes and identifies the volumes of HLW at DOE facilities nationwide and uses or updates previous Spent Nuclear Fuel information. The PEIS evaluates only the storage of immobilized HLW canisters. Treatment and disposal of HLW were not analyzed. However, the final disposition of these immobilized canisters is on-site storage "until shipment to a geologic repository for disposal." If this waste is to be disposed at a Yucca Mountain repository, the Draft EIS should evaluate both the treatment and disposal of this waste at Yucca Mountain.

## **SECTION 2. PROPOSED ACTION AND NO-ACTION ALTERNATIVE**

Page 2-2; Section 2.1 - Proposed Action

There is no justification provided for the proposal to permanently withdraw 230 square miles (150,000 acres) of land for the repository. A rationale for this large a withdrawal area should be provided, especially in light of the fact that the proposed underground repository and surface facility cover an area of less than 6 square miles.

Page 2-6; Section 2.1.1 - Overview of Implementing Alternatives and Scenarios

It appears that DOE has chosen to segment the Proposed Action into various transportation and repository development activities. Such activities are further

subdivided into a national and a Nevada-specific transportation program. The transportation program includes the off-site manufacture of shipping casks and disposal containers, construction of a potential rail line to Yucca Mountain, and development of heavy-haul truck capabilities using one or more intermodal (rail to truck) waste transfer facilities. For repository development, DOE has divided activities into surface and sub-surface repository construction. Such segmentation is incompatible with the requirements of a comprehensive assessment of impacts and, in the absence of a Programmatic EIS and tiered EISs for related program components, may be in violation of NEPA.

Because of the multitude of uncertainties associated with these activities, along with the evolving nature of the program, the Draft EIS depends on an analytical environmental impact process that “bounds” impacts likely to result from the Proposed Action. This bounding analysis supposedly incorporates assumptions so conservative that they overstate the risks and thereby fully address the multitude of program impacts and uncertainties. While this approach is typically used for Programmatic EIS documents, this Draft EIS is not a Programmatic EIS.

There are also outstanding and potentially significant non-programmatic issues that are part of the Proposed Action that must be specifically evaluated in the Draft EIS. These issues should not be misrepresented as programmatic alternatives evaluated through a “bounding analysis.” For example, Navy spent fuel in storage at the Idaho National Environmental Engineering Laboratory will be shipped by rail to a geologic repository. Consequently, either rail access to Yucca Mountain will be developed or an intermodal waste transfer facility and heavy-haul trucks will be required to move Navy spent fuel to a Yucca Mountain repository. Since the Draft EIS is not a programmatic document and fails to evaluate the impacts of moving Navy fuel to Yucca Mountain, supplemental NEPA documents must be prepared to assess such impacts. To do otherwise misrepresents the NEPA process.

Since titanium drip shields are required for all repository design scenarios discussed in the Draft EIS, DOE must also address resource impacts and costs associated with the acquisition and manufacture of the drip shields.

The Draft EIS explicitly acknowledges that DOE does not have a final or even current design for a repository at Yucca Mountain. There is, therefore, no realistic basis for evaluating the impacts of the Proposed Action on people and the environment. The Draft EIS states “DOE recognizes that the plans for a repository would continue to evolve during the development of the final repository design and as a result of U.S. Nuclear Regulatory Commission licensing review of the repository. In addition, decisions on how spent nuclear fuel and high-level radioactive waste would be packaged ... would be part of the transportation planning process.”

This statement reflects the legal and substantive insufficiency of the Draft EIS. Future decisions regarding the facility design, transportation system configuration, and repository operations - decisions that are not part of the analysis contained in the Draft EIS - can drastically alter the type and significance of impacts that are generated. The Draft EIS should have included a detailed and specific repository design that can be identified and evaluated as integral to the Proposed Action. Likewise, other aspects of the Proposed Action that can generate significant impacts, such as the transportation system, must be identified and described at a level of detail that permits adequate impact identification and assessment. Attempting to compensate using unclear, undefined, and overly generic descriptions of the Proposed Action seriously interfere with the ability of the public and other reviewers to evaluate the adequacy of the analyses contained in the Draft EIS.

Page 2-9; Section 2.1.1.3 - National Transportation Scenarios

The Draft EIS fails to identify the national highway, rail, and barge shipping routes that would be used to transport SNF and HLW from generator sites to Yucca Mountain. Absent such clearly identified routes, it is impossible to adequately assess impacts to communities and the environment along transportation corridors. The failure to specify routes and to conduct route-specific impact assessments not only prevents citizens living in cities and communities along those routes from participating effectively in the NEPA process, but it also precludes a differential comparison of risks and impacts among alternative routes and combinations of modes and routes. This is a major shortcoming of the Draft EIS and is, itself, grounds for determining that the Draft EIS is substantively and legally deficient.

Page 2-9; Section 2.1.1.4 - Nevada Transportation Scenarios and Rail and Intermodal Implementing Alternatives

The Draft EIS is deficient in its analysis of SNF and HLW transportation scenarios within Nevada. The Draft EIS fails to evaluate and compare all of the available highway alternatives in Nevada, including at least one routing alternative identified by the Nevada Department of Transportation (NDOT) that involves shipping waste from the northeast via I-80, U.S. 93, U.S. 6, and U.S. 96 (the NDOT 'B' route). NDOT considered this route to be a principal alternative to the shipment of waste through the Las Vegas Valley. DOE ignores this alternative in the Draft EIS by indicating that it has not been formally designated as a preferred alternative by the State of Nevada. The absence of formal designation at this time - years before a repository has been approved, much less constructed - should not constitute a reason for failing to evaluate one of the most likely alternative highways routes to a Yucca Mountain facility.

In almost every aspect of the Proposed Action, DOE makes assumptions about future conditions and future actions and proceeds to incorporate those assumptions into its analyses. This is true of the repository design, facility performance, the operations of the repository and support facilities, the source of energy and water for the project, and many other areas of the Draft EIS. The failure to evaluate the NDOT 'B' route in the Draft EIS on the grounds that it requires an assumption of a future designation by the State demonstrates the fundamental inconsistency and self-serving nature of the analyses contained throughout the Draft EIS.

Likewise, the Draft EIS fails to evaluate each of the rail spur and intermodal facility alternatives at the same level of analysis and with the same level of information. It also postpones the selection of a preferred rail spur, intermodal facility location, the identification of specific rail spur alignments, and the analysis of specific operational aspects and impacts of the rail/intermodal system to some future, undefined time. Nevada contends that there is sufficient information available now for DOE have to compared rail spur alternatives, identified a preferred alternative, identified a specific and clearly defined rail alignment within the preferred corridor, identified whether an intermodal transfer facility is needed, and, if needed, selected a preferred site for such a facility. Failing to undertake these analyses and present findings in the Draft EIS makes it impossible for potentially impacted citizens and communities to effectively participate in the NEPA process.

Although DOE maintains that the "mostly legal weight truck" and "mostly rail" scenarios adequately bound the analysis for the national transportation scenarios, this is not true for the Nevada Transportation Scenarios. Under the "mostly legal weight truck" scenario, DOE must still deal with more than 300 rail shipments of high-level waste and Naval fuel **(references)**. The Nevada Transportation Scenario fails to describe how DOE will deal with these shipments without either constructing a rail line or operating an intermodal transfer site and heavy-haul trucks.

#### Page 2-10; Section 2.1.1.5 - Continuing Investigation of Design Options

The text states " ... this EIS describes and evaluates the current preliminary design concept for the repository and current plans for repository construction, operation monitoring, and closure." This statement is inaccurate. The design contained in the Draft EIS is no longer the current repository design being used by DOE for planning purposes, site recommendation, and licensing. In fact, there are major differences between the design used in the Draft EIS and the one DOE is now using as its reference design. Given the extraordinary long duration of the project, the difficulties in adequately bounding uncertainties even under the most favorable conditions, and the characteristics of the materials to be handled, stored, and disposed of at the facility, the use of an

outdated and obsolete project design as the basis for impact analyses in the Draft EIS is unacceptable. DOE must decide on the facility design it intends to use and then conduct the required impact and performance assessments based on that design. To do otherwise renders the NEPA analysis inadequate.

This section concludes that, even though a broad range of repository design features and alternatives are still under consideration, "the analytical scenarios and implementing alternatives evaluated in the EIS provide a representative range of potential environmental impacts the Proposed Action could cause." This conclusion is drawn from an analysis of options for design features and design alternatives in Appendix E, from which DOE determined that "impacts from the design options would be relatively minor in relation to the potential impacts evaluated in this EIS."

NEPA Regulations, 1502.18(b), state that an appendix shall "[n]ormally consist of material that substantiates any analysis fundamental to the impact statement." DOE's conclusion is not substantiated by the analysis in Appendix E because it is clear that some design alternatives and options in combination, or alone, will have significantly greater and different environmental impacts than the alternative thermal load designs evaluated in the Draft EIS. It is made clear in the Draft EIS that all the design feature options and alternatives are available for future DOE decisions.

The Draft EIS fails to reliably define a proposed repository design and holds open a range of design options that would require extensive additional environmental impact analysis. This condition exists in the Draft EIS, despite the fact that the Final EIS, mandated by the NWPA to be included in the Secretary's Site Recommendation Report, must also include "a description of the proposed repository, including preliminary engineering specifications for the facility." (Sec. 114(a)).

From the many options available, it is not possible for a reviewer to identify a description of the proposed repository and thus evaluate the nature and extent of its potential impacts on the environment.

#### Page 2-11; Section 2.1.2 - Repository Facilities and Operations

The statement is made that "... spent nuclear fuel and high-level radioactive waste would be handled remotely with workers shielded from exposure to radiation using design and operations practices in use at licensed nuclear facilities *to the maximum extent practicable*" (emphasis added). Since the Yucca Mountain facility is required to be licensed by the NRC and all facility operations would be carried out under NRC regulations, it is inaccurate to assume that practicability would dictate which regulations would be followed and which would not be. The statement that practices used in other

licensed facilities would be implemented at Yucca Mountain only to the extent practicable is indicative of the assumption throughout the document and the entire DOE program that regulations and requirements can be changed, modified, or suspended to meet the dictates of the project.

Page 2-11; Section 2.1.2 - Repository Facilities and Operations

The 870 acre repository operations area described here does not reconcile with the description of disturbed land and repository subsurface area found in Table 8-4 and on page 8-8. This difference should be clarified.

Page 2-13; Section 2.1.2 - Repository Facilities and Operations

The intent to end emplacement in 2033 coincides with the last year of current reactor operating licenses. Will the last spent fuel generated by the last operating reactor be shipped to the repository immediately after reactor shut-down? Can this be done with the planned transportation casks? Does this require any special considerations for operations in the Waste Handling Building at the repository surface facility? Also, calcined waste from INEEL won't be ready for shipment off-site until 2035. If this waste is to be emplaced in a repository at Yucca Mountain, the Draft EIS should be revised to reflect the possible change in the date for the end of emplacement at Yucca Mountain.

It should be noted that the NWPA requires the waste to be retrievable from the repository for 50 years after initial emplacement. This means that, according to the schedule in Figure 2-9, the repository could be closed as early as 2060. Also, the rationale for assuming repository closure 100 years after first emplacement must be explained beyond the minimal explanation in Appendix E, at E.2.3.5, Timing of Repository Closure. This schedule is arbitrary, and the only number with any current basis is 50 years, as stated in the NWPA.

Page 2-15; Section 2.1.2 - Repository Facilities and Operations

Figure 2-9 shows that site characterization ends in 2005 and performance confirmation starts in 2010. The text on page 2-13 discusses "preconstruction performance confirmation." This should be indicated in Figure 2-9. There should also be an explanation of the differences between site characterization activities, preconstruction performance confirmation, and performance confirmation. From the text, at least the first two are remarkably similar. On page 2-16, the Draft EIS states that the "performance confirmation program would continue some site characterization activities through repository closure." This is contrary to the requirement in the NWPA that site characterization activities be completed prior to Site Recommendation (Sec. 114(a)(1)).

Page 2-16; Section 2.1.2.1.1 - North Portal Operations Area

It should be pointed out that the design of this part of the repository surface facility, including the buildings and operations in the restricted area, is preliminary and, at best, conceptual. DOE has not even finally decided (contrary to information in the Draft EIS) whether the Waste Handling Building will employ the use of waste transfer pools or use hot cells exclusively.

The Draft EIS fails to adequately describe and evaluate impacts of specific types of facilities needed to receive, package, and handle spent fuel and high-level waste for disposal. The Draft EIS attempts to avoid specific analyses by indicating that the nature of such operations would depend on how the spent fuel is packaged for transport. Nevada contends that the information currently exists for DOE to clearly identify specific operational requirements and to discriminate among alternatives for operations at the North Portal facilities. However, this requires a more adequate, substantive, and site-specific analysis of spent fuel and HLW at reactor and generator facilities and the specific modes to be used for shipment from each site. Such an assessment is clearly within the technical capabilities of DOE and within the appropriate scope of the Draft EIS. DOE should be able to identify, with considerable certainty, the type of package that would be received at the North Portal from each reactor/generator site. With that information, DOE can then specify, in considerable detail, the actual facilities and activities required at the North Portal area. Such a detailed description is needed in order to conduct an adequate assessment of risks and impacts.

Such an analysis would also help to clarify the differential risks and attendant mitigation associated with various handling scenarios. For example, if the analysis showed that a large percentage of the waste would arrive at the North Portal operations area as uncanistered spent fuel (as is very likely, given the market-driven transport system being planned by DOE and commercial utilities), the North Portal Operations Area and facility needs would be considerably different than they would be if most of the waste arrived in dual or multi-purpose canisters.

Page 2-20; Section 2.1.2.1.1 - North Portal Operations Area

The Draft EIS should state how the empty canisters would be decontaminated and what would be done with the resultant waste from the decontamination.

Page 2-21; Sections 2.1.2.1.3 and .4 - Ventilation Shaft Operations Area

The Draft EIS does not describe the method to be used for ventilation shaft construction and does not appear to describe the environmental impacts specific to shaft construction.

Section 4., Section 2.1.2.2.1, Subsurface Facility Design and Construction, implies that the shafts are not planned to be constructed by drill-and-blast. This should be clarified.

Page 2-23; Section 2.1.2.1.5 - Support Equipment and Utilities

Is electric power available from the Nevada Test Site sufficient for all potential repository construction scenarios involving multiple tunnel boring machines? If additional power is required from external sources, the means by which the power will be transmitted to the repository should be considered in this Draft EIS.

To accommodate repository operations, DOE will need to substantially upgrade the Nevada Test Site (NTS) utility infrastructure as well as utility feeder lines to the NTS. Yet detailed discussions about resolving the utility infrastructure limitations and power supply problems are not provided in the Draft EIS. While several programmatic options are briefly mentioned, the Draft EIS fails to evaluate specific alternatives. The Draft EIS only states that “the approach in all cases would be to use existing power corridors where possible to limit environmental impacts and to reduce the need for additional rights-of-way.” The Draft EIS further states that “depending on the option chosen, additional National Environmental Policy Act analysis could be required” (see page 4-72). Because repository development could not proceed without an adequate electrical supply system, DOE must address environmental impacts of providing additional power to the Yucca Mountain site. The Draft EIS fails to provide such an assessment and, thus, is deficient. Moreover, like other significant Draft EIS issues, DOE simply defers selection of alternatives and detailed analysis to an unspecified future NEPA process.

Page 2-23; Section 2.1.2.2 - Repository Subsurface Facilities and Operations (Including Waste Packages)

The low thermal load repository would include Area 5 in order to provide sufficient underground emplacement area. Area 5 has not been the object of site characterization and, therefore, should not be included in the Draft EIS or repository planning until it has been characterized. According to the NWPA, the Secretary's site recommendation is to be made at the completion of site characterization. In the case of the low thermal load alternative design, site characterization has not been started, much less completed, in a portion of the area included in the Proposed Action. If the low thermal load alternative is to be considered a reasonable alternative, the Draft EIS should be deferred until characterization of Area 5 is satisfactorily completed.

This is especially important in light of currently developing information regarding saturated zone flow and transport. Essentially nothing is known about groundwater flow beneath Area 5 and how it might be influenced by the Solitario Canyon fault and other



faults known and unknown. (See page 3-52 that states, "West of the Solitario Canyon fault groundwater probably flows southward either along the fault or beneath Crater Flat.") This introduces a new and major uncertainty in the performance assessment of the repository, to the extent that it precludes any certainty regarding flow paths along which radionuclides would travel from a significant portion of the repository. The Proposed Action is fatally flawed under these circumstances, as is the credibility of the impact analysis in the Draft EIS.

Page 2-27; Section 2.1.2.2.1 - Subsurface Facility Design and Construction

Concrete liners are no longer part of the repository design. An accurate, current description of the repository design should be included in the Draft EIS.

Under what circumstances and in what manner would waste packages be moved over other waste packages? Does the technology exist at this time to do this? Have scenarios where waste packages are dropped on other waste packages been evaluated? The Draft EIS should include a discussion of this aspect.

Page 2-31; Section 2.1.2.2.1 - Subsurface Facility Design and Construction

Water usage during site characterization and the construction of the ESF was not adequately monitored, evidenced by the multiple quality assurance findings and nonconformance reports written about the tracking of water usage. What other controls would DOE use to ensure that water used during construction of the repository would not affect repository performance?

Page 2-31; Section 2.1.2.2.2 - Waste Package Design

The waste package design is preliminary and conceptual. The design, as described in the Draft EIS, is no longer the operative design concept, and it is likely to change again as more is learned about the proposed materials and their interaction with various potential near-field environmental conditions at the selected thermal load conditions.

The real purpose of the waste package is to provide structural strength during emplacement and possible retrieval operations and to assure complete waste containment during the period of decay of the primary fission products, Sr-90 and Cs-137, a period of up to 1,000 years. After this period, the geologic barrier is intended to provide the necessary waste isolation for the long-lived radionuclides.

Since the waste package is so central to repository performance and to the amplification or attenuation of impacts from the facility, the Draft EIS should contain a complete and

final description of the waste package chosen by DOE to insure waste containment. It would also be appropriate for the EIS to comprehensively evaluate alternative waste package designs and select the preferred design for use in a Yucca Mountain repository. Instead, the Draft EIS seeks to substitute generic descriptions in an attempt to leave maximum room for constantly evolving designs in order to compensate for the poor performance of the geologic barrier system. Given the extraordinarily poor geological waste isolation characteristics of the Yucca Mountain site and without a clearly articulated waste package design, it is impossible to evaluate the environmental and human health impacts of the repository.

Page 2-32; Section 2.1.2.2.2 - Waste Package Design

The current design of the waste package has the two layers flipped. The Alloy-22 is now on the outside of the canister with the carbon steel on the inside.

Issues of criticality are addressed by stating that neutron absorbers (if needed) would be placed within the waste package so that no criticality could take place “even if the package somehow became full of water.” There is no discussion of the resultant possible steam explosion that could occur if water made contact with the waste form. A steam explosion could be almost as bad as a criticality incident. Any kind of explosion inside an emplacement drift could be detrimental to the entire repository block.

Page 2-34; Figure 2-21 - Conceptual design of waste package in emplacement drift.

The current conceptual design of the emplacement drift does not include a concrete liner. The current conceptual design of the emplacement drifts should be described in Section 2.1.2.2.3, Waste Package Emplacement Operations.

Page 2-37; Section 2.1.2.3 - Repository Closure

This section should include a discussion of alternative design features that may be included, such as drip shields and emplacement drift backfill. It should also discuss the expected effectiveness of seals for ramps and shafts and the basis for the expectation.

This section should describe the closure plans for the performance confirmation drifts and boreholes.

DOE should describe in the Draft EIS sealing materials and placement methods to reduce the creation of preferential pathways for water to contact the waste package.

Page 2-37; Section 2.1.2.4 - Performance Confirmation Program

As part of performance confirmation and prior to initiation of waste emplacement, DOE should commit to a demonstration of a full drift emplacement-retrieval cycle as a proof of operational capability.

Page 2-38; Section 2.1.3 - Transportation Activities

See comments on Section 6, Environmental Impacts of Transportation and Appendix J for a detailed critique of transportation issues and impacts presented in the Draft EIS.

Page 2-38; Section 2.1.3.1 - Loading Activities at Commercial and DOE Sites

The text states “..the EIS assumes that at the time of shipment the spent nuclear fuel and high-level radioactive waste would be in a form that met approved acceptance and disposal criteria for the repository.” In the case of commercial spent fuel, there is no basis for making such an assumption. Given the market-driven, *laize faire* approach planned for transporting spent fuel from reactor sites to Yucca Mountain, the form of the spent fuel to be shipped will be determined by the type of transport canister used and the shipment mode selected. Both of these factors will be determined largely by economic factors and by conditions and infrastructure at each reactor location. DOE will likely deal with widely diverse spent fuel configurations, including different shipping cask configurations, different shipment loads and weights, different conditions of fuel elements, etc. The overly optimistic assumption that spent fuel and HLW received at the repository surface facilities will be in standard forms and require little or no remediation or special handling is erroneous and understates the difficulties associated with the waste acceptance and handling operations at the repository.

The level of effort required at a repository waste acceptance, handling, and processing facility will be one that is unprecedented in volume, diversity of waste forms, and duration. The handling of spent fuel is currently done only on a very limited scale, usually one or two fuel assemblies at a time, at reactor locations. There is no experience with the scale and complexity of operations that would be required to process hundreds of thousands of spent fuel elements (both at points of departure and at the repository surface facilities) over a sustained period of 30 years or more. The Draft EIS completely ignores the unprecedented nature of this effort and, instead, treats it as if it were a routine industrial activity.

Page 2-40; Section 2.1.3.2 - National Transportation

The analysis of national transportation impacts associated with the Proposed Action contained in the Draft EIS is both legally and substantively deficient. The Draft EIS presents an inappropriately generic analysis of impacts; fails to identify cross-country shipment modes and routes that would be necessary to implement the Proposed Action; ignores impacts to corridor cities and communities across the nation; misrepresents actual shipment volumes; underestimates the impacts of worse case accidents and terrorist/sabotage events; understates the potential health effects of routine, non-accident shipment operations; employs unrealistic shipping scenarios as the basis for analysis; ignores potentially significant and pervasive socioeconomic impacts associated with the massive and unprecedented shipping campaign required to move waste from generator locations to Yucca Mountain; and generally understates risks to health, safety, and the environment. The State of Nevada's comments regarding the treatment of national transportation issues and impacts can be found in comments on Section 6 of the Draft EIS and Appendix J below.

Page 2-40; Section 2.1.3.2.1 - National Transportation Shipping Scenarios

The use of two national shipping scenarios that DOE acknowledges as unrealistic is inappropriate for the type of analysis required in a Draft EIS of this scope and importance. Evaluating "mostly truck" and "mostly rail" shipping scenarios grossly oversimplifies the complexities and impacts of the type of shipping campaign that will be required. Such an approach does not "bound" the likely impacts, but serves to obscure them. Any realistic shipping scenario will require a complex mix of truck, rail, and barge transport and a logistics and coordination system that has never before been attempted for materials of the kind to be shipped to a repository.

Information currently exists that would have permitted DOE to specifically identify what shipments from which reactors/generator sites would be shipped by rail, rail-barge, or truck, in what volumes, over what time frames, and along what specific shipping routes. DOE chose not to perform such an analysis, which would have required, among other things, the disclosure of preferred shipping routes and information about the types and numbers of shipments along those routes. The generic analysis that DOE did perform, using unrealistic shipping scenarios, is inadequate and cannot be used as the basis for the identification of potential national transportation impacts or for making future national transportation decisions.

The Draft EIS states: "These [bounding] scenarios illustrate the broadest range of operating conditions relevant to potential impacts to human health and the environment." This statement is incorrect, since the "mostly Legal-Weight Truck" scenario includes rail

shipments. Without constructing a new rail line in Nevada or operating an intermodal transfer and heavy-haul truck shipment system in Nevada, the shipments dependant on rail will either have to be repackaged in smaller containers in Nevada or not shipped to the proposed repository at Yucca Mountain.

Pages 2-41 and 2-42; Figures 2-26 and 2-27 - Highway and Rail System Maps

The maps do not show the locations of potentially affected Native American tribes in relation to the interstate highway and rail systems. Even in the absence of identified shipping routes (a major shortcoming of the Draft EIS that is discussed in detail elsewhere in these comments), the document should have provided some indication of Native American lands that are traversed by, or are located in proximity to, highway and rail routes. Numerous Native American lands/communities outside Nevada will be impacted by spent fuel and HLW shipments including: Gila Bend, Navajo, San Xavier, and Salt River in Arizona; Umatilla and Cow Creek in Oregon; Miccosukee in Florida; Fort Hall in Idaho; Winnebago in Nebraska; Cattaraugus in New York; Quapau, Ottawa, Modoc, Sac Fox, in Oklahoma; and others. The failure to identify Native lands and communities along transportation routes and to assess impacts of the Proposed Action on those entities is another indication of the inadequate and superficial treatment of transportation impacts in the Draft EIS.

Page 2-43; Section 2.1.3.2.3 - Mostly Rail Shipping Scenario

There are significant differences in the operation of the shipping campaign if general freight is used instead of dedicated trains. Use of general freight could result in significant delays during shipping, will require shipments to pass through many rail yards that could be avoided, and will probably result in shipments being switched in the UP rail yard near Las Vegas prior to being sent to the Yucca Mountain specific holding track. These actions increase potential exposure to workers and the general population and increase the probability of accidents in rail yards in general and during switching activities.

The last paragraph indicates that, “[s]ome of the logistics of rail transportation to the repository would depend on whether DOE used general or dedicated freight service.” The use of general freight service, in which the casks are shipped along with other railcars of freight, should not be considered as a viable alternative. When shipping in general freight, the railroad would pick up rail cars containing radioactive waste and move them along with other freight. Moving such high-level radioactive waste destined for Yucca Mountain under general freight introduces uncertainty and a reduced level of control.

Rail cars could be set out at interchange points where they might sit for an undetermined time before being switched to another train for continued movement toward the final destination. Although Federal Railroad Administration regulations require that hazardous materials be moved within 48 hours if not set out at the final destination, there are no regulations regarding the locations where such rail cars may be “parked.” Rail cars could be parked at locations where an incident or accident would have high consequence, and in fact, switching locations are often found in such high consequence locations, near or in highly populated areas.

Such handling subjects the rail cars to possible operational dangers associated with several or numerous switches while in general freight status, as well as exposure and security threats while “parked” in unsecured locations. Additionally, in general freight, the special nature of the radioactive waste cars would be obscured to both railroad employees and management as well as the public, leading to further risk as the shipments become routine over time.

Page 2-44; Section 2.1.3.3 - Nevada Transportation

The State of Nevada finds the analysis of Nevada transportation impacts associated with the Proposed Action contained in the Draft EIS to be legally and substantively deficient. The Draft EIS fails to address the interconnectedness of national and Nevada transportation issues and impacts. Instead, the Draft EIS treats Nevada transportation as if it were entirely isolated from the national transportation system and the characteristics, decisions, and other factors that condition and drive the national spent fuel and HLW shipping campaign. For example, the issue of rail access to Yucca Mountain will have a major impact on the type and number of shipments that occur across the country. Likewise, the viability of, and decision to go forward with, an intermodal transfer facility in Nevada will be a major determinant of modal mix for shipments nationwide. Conversely, decisions made by utilities and contract shippers regarding transportation casks, routing considerations, weather, and many other factors will determine routes that are impacted within Nevada. Acknowledgment of such interconnectedness is not addressed in the Draft EIS.

The Draft EIS contains an inadequate and superficial treatment of Nevada transportation issues and impacts. The Draft EIS fails to evaluate alternative highway routes in a manner that permits the identification of preferred alternatives, and the level of information and analysis is different for various routes. The Draft EIS completely ignores at least one of the most likely highway shipping routes through the State (the NDOT ‘B’ route). Moreover, the analysis of potential rail spur alternatives is uneven, exclusive of potentially attractive alternatives, lacks specificity, and insufficient for selecting preferred alternatives. Also, the analysis of rail construction impacts and the impacts/necessities of

operating a rail line within Nevada are grossly understated. The evaluation of potential intermodal transfer facility locations is based on inadequate, extraordinarily incomplete and uneven information and fails to identify a preferred location, which is essential for adequately assessing impacts of other aspects of the transportation system, both in Nevada and nationally. The assessment of the costs and impacts of heavy-haul transportation on Nevada highways is incomplete and understates the difficulties inherent in an unprecedented activity of such scale and duration, difficulties and costs that will likely make intermodal transport within Nevada infeasible. Finally, the assessment of potential socioeconomic impacts associated with spent fuel and HLW transportation in Nevada is incomplete, inadequate, and fails to address the range of significant impacts to communities along the identified rail spur and to the State as a whole.

The Draft EIS assumes that shipment security and escorts, as required under 10 CFR Part 73.26, would be implemented by the licensee (in this case, DOE) or its agent. Under this scenario, the State of Nevada (i.e., the Nevada Highway Patrol) would have no role in escorting or providing security for these shipments. However, it is State of Nevada policy that, in addition to any other security or escort measures provided by the licensee or his agent, appropriate State law enforcement staff will escort each of these shipments and vehicles while traveling on Nevada highways. Costs of such security measures are impacts to the State and should have been assessed in the Draft EIS.

Other areas directly affecting the State in responding to the unprecedented spent fuel and HLW shipping campaign required to implement the Proposed Action include costs and impacts associated with:

- real time vehicle tracking and the associated costs
- vehicle inspection (legal-weight trucks and heavy-haul trucks)
- equipment (initial purchase, maintenance, and replacement)
- ports of entry and vehicle inspection facilities at intermodal transfer stations
- training (initial first responder, advanced training, and ongoing training)
- accidents and incidents
- emergency response equipment and training
- private/government agency emergency response personnel

- safe havens
- designated and alternative routes
- en route repair facilities, towing of vehicles, and availability of parts to repair trucks
- security of shipping casks during en route repair of heavy-haul trucks
- possible acts of sabotage
- health exposure issues to personnel

None of these costs/impacts on the State of Nevada and local governments are addressed in the Draft EIS.

The Draft EIS states: “The EIS analysis assumed that the proposed Interstate bypass around the urban core of Las Vegas (the Las Vegas Beltway) would be operational before 2010.” DOE should state the basis for this assumption in the EIS, including a description of the proposed funding and construction schedule for the beltway. Urban growth frequently occurs along newly constructed urban beltways, increasing traffic volumes on these highways. Therefore, the EIS should also include a projection of future growth patterns associated with the proposed beltway and a projection of future traffic volumes on the proposed beltway during the life of the shipping campaign.

See also comments on Section 6 of the Draft EIS.

Page 2-44; Section 2.1.3.3 - Nevada Transportation

Specification of Three Scenarios:

The Draft EIS approach is seriously flawed for several reasons. DOE states “that it cannot predict the specific transportation mode (truck or rail) of each shipment to the repository.” Therefore, none of the options described on page 2-44 accurately describe the Proposed Action for Nevada transportation and hence, do not accurately bound the potential impacts. The statement that DOE cannot predict the specific mode for each shipment implies that DOE cannot control the mode of shipment. Even if one of the options is ultimately selected, sites could ship by any of the modes. Therefore, the legal-weight truck option could result in shipments by rail to Nevada. Without rail access, DOE will be forced to either repackage the materials before shipping them to the Yucca Mountain site or to ship them by heavy-haul. If the rail or heavy-haul option is selected,



sites could ship by legal-weight truck, resulting in many more shipments through Nevada than projected. Thus, it is impossible to accurately predict the impacts unless DOE selects a preferred alternative and implements some method of control over the mode selection for shipments.

DOE has not adequately demonstrated the technical, regulatory, economic, or environmentally acceptable feasibility of any of the options. As will be discussed in more detail later in these comments, there are serious flaws with each option. In summary, all of the rail route options (and hence, most of the heavy-haul route options) have serious land use, environmental, technical, and economic problems. The concept of an extensive heavy-haul shipping campaign on public highways may not be legally valid and poses significant traffic safety concerns. The legal-weight truck option is itself dependant upon the feasibility of either rail or heavy-haul access and thus, is not an independent option.

Page 2-45; Figure 2-28 - Southern Nevada highways

A major concern with the Draft EIS analysis is the assumption that the yet-to-be-completed Las Vegas Beltway will be available for waste shipments and that the area around the beltway will remain less populated and less congested than I-15 and the “spaghetti bowl” intersection of I-15 and U.S. 95. Given the growth rates experienced by Clark County over the past two decades and the urbanization already occurring in the area of the beltway, it is likely that traffic and congestion along the beltway will substantially increase by the time waste shipments would begin. This concern is supported by population projections from the Clark County Department of Comprehensive Planning that show a population of more than 451,000 within two miles of the beltway and more than 1.2 million within five miles by 2010. Housing units at two miles in 2010 are estimated at over 181,000 and nearly 602,000 at five miles. Employment for this same population is estimate at over 313,000 (at 2 miles) and over 625,000 (at 5 miles from the beltway).<sup>19</sup>

The Draft EIS entirely ignores the impacts associated with this level of population growth and the impacts of superimposing a major spent fuel and high-level waste shipping campaign on the major transportation artery for the population base. Such impacts are magnified when the characteristics of a heavy-haul shipping campaign of the type, volume, and duration required for the Proposed Action are factored in.

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<sup>19</sup> Source: Clark County Department of Comprehensive Planning, memorandum from Cherie Garrity to Jim Rhode, Nevada Highway Patrol, dated December 6, 1999.

The City of North Las Vegas points out that the initial proposed beltway between I-15 and U.S. 95 will not meet Interstate freeway standards until well after waste shipments begin under the Proposed Action. Initially, the beltway will be a two to four lane road with at-grade intersections. The Draft EIS fails to address impacts associated with the sustained use of such a highway for spent fuel and HLW shipments, including heavy-haul truck shipments.

Page 2-47; Section 2.1.3.3.1 - Nevada Legal-Weight Truck Scenario

The Draft EIS completely ignores the costs and impacts associated with the type of vehicle inspection and escort operations that would be required upon entry into Nevada. Prior to transporting waste through Nevada, safety compliance of vehicles, loads, and drivers must be assured by appropriate State agencies. Legal-weight trucks would need to be inspected at port of entry facilities where vehicle and driver compliance verification with state and federal laws and regulations would be performed, shipping papers reviewed, and escorts assigned to accompany trucks. To capture commercial vehicles entering the state on I-15, ports of entry need to be constructed at or near Mesquite and Jean/Sloan.<sup>20</sup>

Costs to build ports of entry include land acquisition, construction, equipment and training, personnel, utilities, and other on-going or related expenses. Details of these costs are contained in the Nevada Highway Patrol study Base Case Scenario-High Level Transportation (see Attachment R). Other activities could also be conducted at the port of entry. These activities could include vehicle inspection, issuing NDOT oversize load permits, and other related permit activities.

The ports of entry should have one inspection bay and pit that is segregated and protected from the other bays to provide maximum protection to employees and others using the facility during an inspection of vehicles transporting radioactive shipments.

The Nevada Highway Patrol estimates initial (start-up) costs for required ports of entry for inspection of legal-weight truck shipments at over \$43 million, with subsequent annual costs for operating the ports of entry at over \$6 million (see Attachment R).

Page 2-47; Section 2.1.3.3.2 - Nevada Rail Scenario

DOE's rail corridor selection study is flawed. The first selection criteria used by DOE to select potential routes was land use compatibility. For this criteria, DOE selected

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<sup>20</sup> Should NDOT designate alternative routes, port of entry locations would need to be reviewed.

corridors based upon using “land under public ownership, to the greatest extent possible, to minimize land-use conflicts.” Favorable topography was used as a selection criteria only within “areas not excluded because of land-use conflicts” (Nevada Potential Repository Preliminary Transportation Strategy, Study 1, April 1995, page 25).

There are serious problems with this approach. Land ownership does not accurately reflect land-use. Most western ranching operations are based upon a combination of privately owned fee land and grazing leases on publicly owned lands. In many, if not all cases, the ranching unit depends on these grazing leases to be economically viable. Most grazing leases are held by the ranches that can access the lease as a logical part of their operation. Splitting an existing operation with a rail line that will limit access to the leased land can have significant adverse effects on the operation of the ranch. Using the avoidance of privately owned land as the corridor selection process without regard to the existing ranching operations’ use of private and public lands may very well result in greater impact on an operation than using private land.

Most of the private land in western States with high percentages of federally owned land is land with gentle topography. Early settlers selected the flatter land for their own. The land with rugged topography was not settled and remained in public ownership. This shift to rugged terrain to avoid private land is a dominant factor in most of the routes selected for further study in the 1990 Preliminary Rail Access Study, as reflected by the following: “An option was selected from the Caliente area in order to avoid land use impacts encountered in most of the southern areas of Nevada. ... The base route has the most favorable land-use compatibility, but would incur significant costs due to the complex engineering and construction required to traverse rough terrain” (page 17). “However, the checkerboard pattern of private and public land ownership surrounding the railroads across northern Nevada makes the complete avoidance of private land difficult. The minimum impact departure point is a location about 5 miles west of Carlin. The terrain in this area is so rugged that private developers were uninterested in the land, and as a result, the greater portions of the terrain were left in BLM ownership” (page 21).

By using land ownership for the first selection criteria, DOE’s selection process actually favored more rugged terrain where construction of the proposed rail line is more difficult. This creates many additional land use impacts due to the extensive cuts and fills required by unfavorable topography. These cuts and fills will further exacerbate the problem faced by ranchers in moving livestock and equipment across the rail line.

Crucial habitat for big game is frequently located in or near rugged terrain. This is especially true for crucial winter habitat. Daylight cuts required to traverse rugged terrain also pose a significant threat to big game, which tend to use these areas for movement, especially in times of heavy snow cover. When trapped in a daylight cut, big game

cannot escape from an oncoming train, resulting in significant mortality rates for big game in these areas. Thus, the selection criteria that favors more rugged terrain by virtue of avoiding private land ownership greatly increases the potential impact on biological resources.

Roadless areas are also more likely to be found in rugged terrain. Virtually all potential wilderness areas are located on public lands. The selection criteria that avoids private lands results in more potential impact to roadless areas and potential wilderness areas.

The Nevada rail scenario is also based on the concept of a branch rail line constructed, owned, and operated by DOE that connects the mainline rail system to the Yucca Mountain site. This calls into question the jurisdictional relationship of the branch rail line to both Federal Railroad Administration (FRA) regulations and State oversight through Nevada's participation in the FRA State Rail Safety Program. Currently, there is one other government-owned track leading to the Hawthorne Weapons Depot that has been deemed nonjurisdictional because of its Department of Defense ownership.

The Draft EIS does not address the issue of safety oversight of the spur trackage and operations. The Draft EIS should clearly define the role that existing rail safety oversight should and will play. The Draft EIS should outline the limits to which DOE rail operations will submit to safety regulation by the State and other federal agencies. Clearly, the rail operations should comply with all current and future rail safety regulations of the State and the FRA. The ability to conduct inspections on any DOE rail operations, as with any other short line, is in the public interest. The DOE operation should acknowledge its submission to state oversight and its adherence to State and federal rail safety regulations.

DOE should specifically acknowledge the rights of the State to inspect the construction, operations, rolling stock, and track of any DOE owned or operated railroad. Additional resources and costs to the State in carrying out these activities are impacts that should have been assessed and quantified.

#### Page 2-49; Section 2.1.3.3.2.1 - Rail Line Construction

The Draft EIS states: "Construction activities would include the development of construction support areas; construction of access roads to the rail line construction initiation points and to major structures to be built, such as bridges; and movement of equipment to the construction initiation points. The number and location of construction initiation points would be based on such variables as the route selected, the length of the line, the construction schedule, the number of contractors used for construction, the

number of structures to be build, and the locations of existing access roads adjacent to the rail line.”

The construction activities listed cannot be completed without some environmental impact and will require appropriate mitigation measures. Without a detailed description of these activities, it is impossible to conclude that they can be completed without causing unacceptable adverse environmental impacts, even with mitigation measures. Until these construction activities are specified, DOE cannot conclude that the Proposed Action will not result in unacceptable impacts, as required by NEPA.

Other than indicating that the rail line would be built to Federal Railroad Administration standards, the Draft EIS makes no mention of construction inspection or safety oversight of rail lines or operations by State or federal agencies.

Ballast requirements: Construction of the railroad in any of the proposed rail corridors will require significant quantities of ballast and probably significant quantities of sub-ballast. The Draft EIS does not provide a description of the source for these materials. The quantity of ballast and sub-ballast required should be accurately defined and sources for the material described. Quarrying the ballast and sub-ballast could result in significant environmental impacts not assessed in the Draft EIS.

Installation of Fencing: The description of the Proposed Action should include the location and type of fencing to be installed. Without this information, it is not possible to assess the impacts of the Proposed Action, particularly on wildlife and on land use. The two agencies listed could, in fact, request conflicting requirements for fencing based upon the impact within their area of jurisdiction. Depending on the types and locations of fencing, the Proposed Action could create significant impacts to wildlife, particularly where the proposed corridors cross critical habitat areas.

#### Page 2-50; Section 2.1.3.3.2.2 - Rail Line Operations

The Draft EIS estimates a total of about five trains per week to the repository, but does not include an estimate of the number of trains leaving the repository. This would presumably include return of empty shipping casks as well as additional unloaded cars that were used to ship materials to the site. One cannot automatically assume that the number of unloaded trains leaving the repository will be the same as the number of loaded trains arriving. Therefore, it is not possible to assess the impacts of the rail line from the description of the Proposed Action.

Although discussed in the references to the Draft EIS, this Draft EIS does not discuss the different options for ownership and operation of the rail line or the possibility that the rail

line would be used for other purposes than the Proposed Action described in the Draft EIS. Use for other types of shipments could increase the impacts of the Proposed Action above that described in the Draft EIS.

Again, other than indicating that the rail operations of any DOE rail line would meet Federal Railroad Administration standards for maintenance, operations, and safety, the Draft EIS makes no mention of safety oversight of rail operations by state or federal agencies.

#### Page 2-50; Section 2.1.3.3.3 - Nevada Heavy-Haul Truck Scenario

DOE has not demonstrated that heavy-haul truck is a feasible option to transport railroad casks to the proposed repository. States are required to enforce weight and size limitations on Interstate systems and on routes providing reasonable access to and from the Interstate. The penalty for failure to do so is the withholding of a State's National Highway System apportionment. States may issue permits for overweight and/or oversize vehicles if the load meets the definition of a nondivisible load as defined at 23 CFR 658:

Nondivisible load or vehicle:

- (1) As used in this part, nondivisible means any load or vehicle exceeding applicable length or weight limits which, if separated into smaller loads or vehicles, would:
  - (i) Compromise the intended use of the vehicle, i.e., make it unable to perform the function for which it was intended;
  - (ii) Destroy the value of the load or vehicle, i.e., make it unusable for its intended purpose; or
  - (iii) Require more than 8 work hours to dismantle using appropriate equipment. The applicant for a nondivisible load permit has the burden of proof as to the number of work hours required to dismantle the load.
- (2) A State may treat emergency response vehicles and casks designed and used for the transport of spent nuclear materials as nondivisible vehicles or loads.

The decision as to whether or not to treat casks for the transport of spent nuclear materials as nondivisible is left to the discretion of the states. The Federal Highway Administration (FHWA) adopted a single definition of nondivisible loads to apply to both oversize and overweight loads, since "Congress has authorized the States, in identical terms, to issue overweight and oversize permits 'for those vehicles and loads which cannot be easily

dismantled or divided [(23 U.S.C. 127(a); section 4006(a) of the ISTEA, 49, U.S.C. app. 2311(j)(1)]” (58 FR 11455)

Casks designed and used for the transport of spent nuclear materials were added to the definition of nondivisible loads in the preamble to the final rule. FHWA stated, “Spent Nuclear Fuel: The Pennsylvania DOT pointed out that the FHWA informed the American Association of State Highway and Transportation Officials (AASHTO) several years ago that the FHWA regarded overweight casks used to move spent nuclear fuel as nondivisible. This determination was not reflected in the SNPRM (Supplemental Notice of Proposed Rule Making). The casks used to transport spent nuclear materials, especially nuclear fuel, are extraordinarily strong and heavy, both to prevent a release in case the transporter vehicle was involved in an accident and to block radiation that would penetrate lighter materials. Some of these containment devices can make a vehicle overweight even before the nuclear materials are loaded. These vehicles cannot be used for any other cargo or reduced to legal weights without frustrating their purpose. A new provision has therefore been added which essentially states that specially designed casks used to move spent nuclear fuel meet the definition of a nondivisible load.” (59 FR 30409)

In the Supplemental Notice of Proposed Rule Making, FHWA stated: “Nonetheless, nondivisible load permits should be used sparingly. Loads which are inherently divisible, including bulk items such as liquids, grain, or cement, would not qualify as ‘nondivisible.’ Nor would shipments consisting of more than one of a unit item or assembly, which by itself may be nondivisible. In such cases, items can be removed until the load meets the legal limits. Nondivisible load permits are not ‘loopholes’ in Federal law, and the FHWA expects to see the number of nondivisible load permits stabilize or even decline in the next few years.” (58 FR 11457)

FHWA further clarified the intent of the definition of nondivisible loads with an additional example. “A similar argument has been made, although not in this rulemaking, that tank vehicles weighing more than 80,000 pounds should be eligible for nondivisible-load overweight permits because a partially loaded tank of legal weight is susceptible to cargo surge that can make the vehicle unstable and even cause accidents in turns or emergency maneuvers. By this reasoning, a nondivisible-load overweight permit would be authorized to increase safety. Proponents of this position do not explain the reason tanker operators purchase vehicles that necessarily exceed applicable weight limits when fully loaded. It is certainly true that tank trucks must be operated with particular care; that is the reason the FHWA’s commercial driver’s license regulations require drivers of these vehicles to obtain a special endorsement. But the fact is that liquids, like two concrete panels, are easily divisible. If a safety element were added to the definition

of a nondivisible load, the concept of nondivisibility could lose all meaning if economic interests were to masquerade as safety issues.” (59 FR 11457)

FHWA’s intent when adopting the definition of nondivisible loads was to reduce the number of permits issued for overweight and oversize vehicles. Casks for transporting spent nuclear fuel were added to the definition of nondivisible since the design of the cask requires heavy materials for strength and shielding, resulting in some cases for the need for overweight vehicles. This definition, however, clearly applies to casks that were designed for highway transport, not those designed for rail. In the Supplemental Notice of Proposed Rulemaking, FHWA stated that “shipments consisting of more than one of a unit item or assembly, which by itself may be nondivisible,” are not considered nondivisible. DOE can transport the material in casks that meet the requirements for legal weight and size trucks; they are simply proposing to ship “more than one of a unit item or assembly” by putting many more fuel rod assemblies in a cask designed for rail than they could with legal-weight truck casks.

In FHWA’s example of tank vehicles, they also noted that “the concept of nondivisibility could lose all meaning if economic interests were to masquerade as safety issues.” In this case, DOE is not even claiming a safety benefit for the use of rail casks, but rather just one of convenience. Since the use of rail casks is clearly optional and the material could be shipped in legal-weight casks, DOE’s proposed use of rail casks transported on overweight and oversize vehicles clearly does not meet the definition of nondivisible load and does not qualify for an overweight and oversize permit based upon nondivisibility of the load.

#### Page 2-50; Section 2.1.3.3.3 - Nevada Heavy-Haul Truck Scenario

Heavy-haul vehicles of the type and quantity described in the heavy-haul truck scenario present significant concerns and impacts not addressed in the Draft EIS. Training for inspectors to properly inspect these unique vehicles must be scheduled and performed in a timely manner to insure the safety of all concerned. Vehicle inspection areas must be established at the intermodal transfer station and include appropriate equipment, manpower, and environmentally safe employee working areas.

Escorts for these heavy-haul vehicles will not only provide the usual escort responsibilities, but will also include responsibilities to control and clear large expanses of roadway and conduct preventative sweeps ahead of the load, keeping other traffic moving in an orderly fashion, and interacting with security teams.

Impacts from non-fatal (injury/property) accidents are not addressed in the Draft EIS. However, it is likely that most accidents involving heavy-haul truck (and legal-weight



truck) shipments would cause injury or property damage, rather than fatalities.<sup>21</sup> These accidents will have a substantially larger impact than portrayed in the Draft EIS, especially with traffic congestion, reduced travel lane expectancy, and the necessity to reroute traffic due to highway blockage.<sup>22</sup>

The projected speed of 20 to 30 miles per hour for heavy-haul vehicles is highly optimistic, especially during peak or congested traffic periods. The Nevada Highway Patrol estimates that a more realistic speed would be 12 to 18 miles per hour, which will significantly increase traffic congestion and disruption along affected highways.

#### Page 2-51; Section 2.1.3.3.3.1 - Intermodal Transfer Stations

This section describes the possible locations, configurations, and operations at an intermodal facility. It points out the increased handling and logistics introduced into any multi-modal transportation campaign to the Yucca Mountain site. It refers to transfer cranes and movement of casks from rail cars to heavy-haul trucks. This added transfer of the casks introduces increased risks to any transportation campaign. This movement, which would not be necessary in a rail-only shipping campaign, increases the possibility of an accident or damage to the shipping casks or the containers inside.

This scenario also contemplates heavy-haul truck transport primarily through congested metropolitan highway systems where impacts of such transport have not been adequately assessed.

The issue of general freight versus dedicated trains is expanded upon in this section. Intermodal transfer station operations would depend on whether the railcars that carried spent nuclear fuel and high-level radioactive waste arrived on dedicated or general freight trains. DOE states that there will be operational differences for the intermodal transfer station between the dedicated train and general freight options. The Draft EIS, however, does not contain sufficient information on these differences to allow an evaluation of the difference in impacts between the two options. The difference between staging requirements for the heavy-haul vehicles for the two options should be described. If general freight is used, the Draft EIS states that the "General freight trains would switch from the main Union Pacific track to an existing or newly constructed passing track." The Draft EIS does not state where the existing or newly constructed passing track would be located. If it is located at the intermodal transfer station, this would significantly alter the design of the station. If a new passing track is constructed at a location independent

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<sup>21</sup> Section 6.2.4.2.1

<sup>22</sup> See Attachment S for comparing fatal and injury crash rates for large trucks.

of the station, this would create potential impacts that have not been evaluated. Even if an “existing passing track” is used, this would probably require the Union Pacific to construct a new passing track for other railroad traffic.

Any delivery by dedicated trains would move directly into the intermodal facility for cask inspection and transfer to trucks. Shipments via general freight would be “set out,” as is typical for railroad operations, on a siding at the intermodal facility. Then a “local” or rail yard locomotive would make the final move into the facility. Again, this clearly introduces another move that involves coupling and uncoupling cars, adding another element of potential human error or mechanical failure.

#### Page 2-53; Section 2.1.3.3.3.1 - Intermodal Transfer Stations

The intermodal transfer station would accept railcars as they arrived (24 hours a day, 7 days a week), but it would normally dispatch heavy-haul trucks during early morning daylight hours on weekdays, consistent with current Nevada heavy-haul shipment regulations. The Draft EIS does not contain sufficient information on the schedule of arriving shipments to the station and the schedule on dispatch of heavy-haul trucks from the station to allow an evaluation of the impacts. During winter time, the restriction on travel during daylight hours will significantly limit the time available for travel from the station to the proposed repository. In December, for example, there are only about 10 daylight hours available for travel. Depending on the location of the intermodal transfer station, dispatch of the heavy-haul trucks in the “early morning daylight hours” could result in heavy-haul trucks traveling through the Las Vegas urban area during rush hour.

The Draft EIS does not provide any information on the impact of limiting travel to weekdays. Given the restriction on travel during daylight hours, this means that casks arriving at the station Friday through Monday morning cannot be dispatched until Monday morning. To comply with NRC requirements, a significant number of heavy-haul trucks will have to be dispatched on Monday mornings. The Draft EIS should provide information on this scheduling requirement and include an evaluation of the impacts of having multiple heavy-haul trucks dispatched during a short time-frame on Monday mornings. Since travel is also prohibited on holidays, this problem will be even worse over three-day holiday weekends.

The number of casks arriving over a weekend could vary significantly depending on whether DOE decides to use general freight or dedicated trains. DOE should state in the Draft EIS its preferred option for the type of service utilized so that an estimate of the number of railcars arriving over a weekend can be made to evaluate impacts of scheduling options. Conceivably, if DOE opts for dedicated train service, the dispatch of

trains from shipping sites could be optimized to prevent an excessive number of casks arriving at the intermodal transfer site over weekends.

Page 2-53; Section 2.1.3.3.3.2 - Highway Routes for Heavy-Haul Shipments

DOE seems to believe that a heavy-haul vehicle of the configuration shown on this page is able to attain speeds of 20-30 miles per hour. Nevada officials believe this is a very optimistic estimate, considering the historical operation of multi-axle, multiple tractored vehicles in this state, and given the grades that need to be traversed along any of the proposed heavy-haul alignments. DOE also states that “if necessary,” they would perform “road upgrades” (e.g., widening the shoulders and constructing turnouts and truck lanes; upgrading intersections that are inadequate to handle heavy-haul truck traffic; increasing asphalt thickness [overlay] of some sections; and upgrading engineered structures such as culverts and bridges). This statement clearly represents an assumption that Nevada’s highway network can accommodate a major heavy-haul shipping campaign with little remedial action. Nevada presently permits approximately one vehicle a year in the configuration shown. The highway system as it now exists cannot sustain the accumulation of axle loads this type of campaign would produce. In fact, infrastructure improvements involving lane construction and widening would be required in both directions for almost the entire length of any of the heavy-haul routes evaluated in the Draft EIS.

Page 2-53; Section 2.1.3.3.3.2 - Highway Routes for Heavy-Haul Shipments

Road upgrades for candidate routes, if necessary, would involve four kinds of construction activities: (1) widening the shoulders and constructing turnouts and truck lanes; (2) upgrading intersections that are inadequate for heavy-haul truck traffic; (3) increasing the asphalt thickness (overlay) of some sections; and (4) upgrading engineered structures such as culverts and bridges. The overlay work would include upgrades needed to remove frost restrictions from some road sections.

The Draft EIS does not contain sufficient analysis of the road upgrade requirements necessary to accommodate these heavy-haul shipments. Southern Nevada experiences extreme heat during the summer. The potential of the heavy-haul trucks causing severe rutting of asphalt surfaces during times of excessive heat should be evaluated. The need to replace asphalt surfaces with concrete to avoid rutting should be evaluated. In areas that experience winter snowfall, snow melt could create saturated roadbed conditions, resulting in pavement damage from heavy-haul trucks. The feasibility of some of the heavy-haul route options depends on upgrades required to remove frost restrictions on some road segments. The upgrades necessary to remove frost restrictions on these roads should also be discussed to justify the feasibility of these options. The possible need to

change road surfaces from flexible pavement surfaces (asphalt) to rigid pavement surfaces (concrete) should also be discussed. If rigid pavement surfaces are necessary, this could significantly alter the estimated cost of the heavy-haul option.

The Draft EIS also does not contain adequate information to demonstrate that the heavy-haul trucks will not significantly reduce the expected life of pavement surfaces. Although DOE contractors admit that a detailed analysis of road wear/damage, based on the current plan for heavy-haul, must be performed to provide final estimates for reduction of road life (*Nevada Potential Repository Transportation Strategy, Study 2, Volume 1*, TRW, February 1996, p.6B8), this analysis was not conducted. Rather, an unsupported assumption that estimated pavement wear would increase by 10 percent was used, even though they recognized that pavement wear would be a major cost driver of the heavy-haul truck option (ibid. p. 6B9).

#### Page 2-54; Section 2.1.3.3.2 - Highway Routes for Heavy-Haul Shipments

The Draft EIS assumes that most borrow material for construction could come from existing Nevada Department of Transportation borrow areas, if the State agreed. Most road design projects attempt to balance cut and fill requirements during construction of the roads. Therefore, it is not reasonable to assume that borrow material will be available in existing borrow areas for the extensive fill requirements necessary to construct truck climbing lanes and other road improvements. Obtaining fill material from other areas could result in significant impacts not discussed within the Draft EIS.

The last sentence in the second paragraph of the first bullet says, “This parking area would be near the U.S. 6 and U.S. 95 interchange at Tonopah.” The point where U.S. 6 and U.S. 95 meet in Tonopah is an intersection in town. It is hardly a place to park this type of truck. This is a busy intersection, not a freeway-type interchange.

#### Page 2-56; Section 2.1.4 - Alternative Design Concepts and Design Features

The NWPA calls for the repository to isolate the waste, not “limit the release and transport of radionuclides.” DOE states in Section 1 of this Draft EIS that a repository “is a system for permanently isolating radioactive materials.....” Therefore, this section should discuss how the design features of the repository will isolate the waste.

As previously discussed, the level of design is insufficient for Site Recommendation, as well as for a license application to the NRC.

Page 2-57; Section 2.1.4.1 - Design Features and Alternatives to Limit Release and Transport of Radionuclides

Of the five design features listed in the category “Barriers to limit release and transport of radionuclides” in Table 2-4, only one - additives and fillers - actually serves to limit release and transport of radionuclides. The remaining four, drip shields, backfill, waste package corrosion-resistant barrier, and ground support options serve only to delay releases and do not eliminate or substantially reduce releases of radionuclides, the true measure of repository performance. The ideal goal of repository performance is to eliminate the potential for release of emplaced radionuclides. The realistic objective is to limit releases, at whatever time they occur, to acceptable levels. The Draft EIS analysis indicates that a Yucca Mountain repository cannot meet this objective, relative to expected peak doses resulting from released radionuclides after the short period of time (300 to 1,000 years) during which the major fission products decay. Juvenile failure of components of the engineered barrier system could result in radionuclide releases prior to the time major fission products have decayed to very low levels.

Many of the features and alternatives discussed in this section and elsewhere in the Draft EIS are actually part of DOE’s current design for a Yucca Mountain repository. As such, the impacts of these features and alternatives should have been fully addressed in the Draft EIS. For example, the current repository conceptual design (not the design described in the Draft EIS) calls for the waste packages to be covered by a continuous titanium drip shield. The Draft EIS should examine the impact on the national (and perhaps international) titanium resource from the increased demand caused by the use of titanium drip shields in up to 100 miles of repository tunnels.

The addition of design features and alternatives is not for the simple purpose of improving barriers that limit the release and transport of radionuclides, as stated in the Draft EIS. Such characterization understates the role of these engineered “fixes.” These design features are essential to demonstrate repository compliance with waste isolation and health and safety criteria. Such reliance on engineered barriers is contrary to the NWPA requirement that the geology of a repository site function as the principal barrier to the migration of radionuclides and that engineered systems function only to add redundancy to the system. As such, heavy reliance on engineered design features as the primary source of waste isolation means that the project, as described in the Draft EIS and in other DOE documents, is inconsistent with the requirement for geologic isolation contained in the Nuclear Waste Policy Act of 1982, as amended.

Page 2-57; Section 2.1.4.2 - Design Features and Alternatives to Control the Thermal/Moisture Environment in the Repository

Neither this section nor Appendix E (at E.2.2.6) considers the obvious alternative to problems associated with thermal output of the spent fuel: let it age in surface storage for the 80 to 100 years needed to reduce the decay heat to a level that does not require special measures in repository design or create large uncertainties in the nature of the near-field environment that would significantly affect repository performance. This alternative should be comprehensively evaluated in the Draft EIS as a reasonable alternative.

Any continuous postclosure ventilation considerations should eliminate all options that result in postclosure openings from the interior of Yucca Mountain to the surface. (See Appendix E at E.2.2.3). Any openings would constitute a large and unacceptable uncertainty in postclosure performance that could not be mitigated. Site characterization studies have shown that, due to the fractured nature of the rock, Yucca Mountain is a naturally ventilated setting above the water table. This fact must be taken into account in long-term performance assessment.

Page 2-58; Section 2.1.4.3 - Design Features and Alternatives to Support Operational and Cost Considerations

DOE should describe and analyze its preferred design concept in the Draft EIS rather than plan to "evaluate the environmental impacts associated with the updated design in the Final EIS." This is an undue limitation on the public's ability to review and comment on this NEPA document and is based only on DOE's self-imposed repository program schedule.

Page 2-58; Section 2.1.5 - Estimated Costs Associated with the Proposed Action

The cost of the repository program should include the whole program, including a breakdown for each thermal load, each packaging scenario, and all transportation scenarios. Given the broad uncertainty in the design of the repository in the Draft EIS, the cost estimate for the monitored geologic repository lacks any substantive basis. The same is true for waste acceptance, storage, and transportation.

The costs estimates associated with the Proposed Action contained in the Draft EIS are grossly understated. The State of Nevada commissioned an independent study of program costs in 1998 (see Attachment T, "An Independent Cost Assessment of the Nation's High-Level Nuclear Waste Program"). The study found that DOE's proposed program, as it was then conceptualized, would cost \$53.9 billion (in 1996 dollars). The study also found that, at most, the Nuclear Waste Fund could be expected to generate

\$28.1 billion (in 1996 dollars), leaving a taxpayer liability of at least \$25.8 billion. The study did not take into account many of the costly “design features and alternatives” DOE now considers essential for the Yucca Mountain facility. It also did not analyze the effect of probable early power plant closures that could significantly reduce the amount of funds generated by the fee imposed on nuclear-generated electricity, the primary source of the Nuclear Waste Fund.

The Draft EIS fails to assess the impact of the projected revenue shortfall on DOE’s ability to implement the Proposed Action. By understating the real costs of the project and failing to reconcile costs with available revenues, DOE obscures a major issue that goes to the heart of the viability of the entire project.

Page 2-59; Section 2.2 - No-Action Alternative

See comments above on Section 1.4.3.4, No-Action Alternative

NEPA requires that federal agencies, in preparing environmental impact statements supporting major federal decisions and projects, consider alternatives to the action being proposed, including the alternative of taking no action. Because the Nuclear Waste Policy Act specifically exempts DOE from the need to examine alternatives to geologic disposal or to the Yucca Mountain site, the principal alternative for comparison with the Proposed Action in the Draft EIS must be the No-Action Alternative. In the Draft EIS, DOE has chosen two No-Action Alternative scenarios that are unrealistic, unreasonable, and legally deficient.

The Draft EIS postulates a situation where, instead of a repository at Yucca Mountain, spent nuclear fuel and high-level radioactive wastes are stored on-site at reactor and generator locations for a period of 10,000 years. In the first “No-Action” scenario, DOE assumes that active institutional control is maintained for the entire time, while under the second scenario, institutional control ceases after the first 100 years.

Both scenarios are wholly inappropriate, even absurd. The Council on Environmental Quality (CEQ) interprets the No-Action Alternative as “the federal agency not acting at all,” i.e., not constructing and operating a repository at Yucca Mountain. In the absence of a repository, it is unacceptable to assume that spent fuel and HLW would simply be left forever at reactor sites. The most plausible No-Action scenario is one where there would be some period (50 to 100 years) of at-reactor storage, most likely in dry storage configurations, combined with the application of waste reduction technologies and followed by some form of a revised (and, hopefully, dramatically improved) process to site and construct storage and/or disposal facilities.

DOE's No-Action Alternative scenarios cannot be defended on the basis of reasonably foreseeable actions in the absence of a decision to move ahead with the development of a repository. Instead, what DOE appears to have done is select scenarios designed to generate the greatest public alarm and political pressure in favor of its Proposed Action. In so doing, DOE has violated the clear intent of NEPA that a realistic and reasonable No-Action Alternative be evaluated and compared to the Proposed Action.

Page 2-60; Section 2.2.1 - Yucca Mountain Site Decommissioning and Reclamation

If Yucca Mountain is not used as a repository under the No-Action Alternative, all openings should be sealed, not just gated. Under the NWPA, the site would be permanently removed from consideration as a repository.

DOE should state that the activities discussed in this section will be carried out according to federal and State requirements and as required by BLM in the applicable right-of-way grants that are, and have been, in place throughout Yucca Mountain site investigations.

This section provides no detail about reclamation procedures, their application, and their chances for success. This issue is elaborated on in Attachment M to these comments.

Page 2-61; Section 2.2.2.1 - Storage Packages and Facilities at Commercial and DOE Sites

It is beyond the scope of this Draft EIS to assume, without further DOE commitment, how DOE spent fuel and high-level radioactive waste would be stored at DOE facilities. Most of the high-level waste is currently in liquid form in underground storage tanks and will still be in 2002, when the No-Action Alternative is assumed to start.

Page 2-67; Section 2.2.2.3 - No-Action Scenario 2

This paragraph conflicts with the third paragraph on page 2-59 that describes the two scenarios for the No-Action Alternative. The information should be consistent.

Page 2-67; Section 2.2.3 - No-Action Alternative Costs

This cost analysis is of no substantive value because, as stated above, neither of the No-Action Alternative scenarios would ever be implemented. Therefore, any cost analysis or comparison in this Draft EIS is not relevant.



Page 2-69; Section 2.3.1 - Alternatives Addressed Under the Nuclear Waste Policy Act

The Draft EIS should not consider any plan to emplace more than 70,000 MTHM at Yucca Mountain for the reason stated in the third paragraph of this section, i.e., the NWPA prohibits this action. Therefore, the discussion of this plan in Section 8 should be removed from the Draft EIS.

This section of the Draft EIS discusses the provisions of the Nuclear Waste Policy Act of 1982 and the amendments to that Act in 1987 that relieved DOE from having to evaluate alternatives to geologic disposal, the Yucca Mountain site, and the time of the initial availability of the repository. The actual language in the Act states that “the Secretary of Energy *need not consider* ...” such alternatives in preparing the requisite environmental impact statement. DOE is, therefore, not prohibited from examining these alternatives, but chose not to in the Draft EIS.

Nevada believes that, given the extraordinary nature, national scope, costs, and potential impacts of the Yucca Mountain project, DOE should have exercised its discretion and included a thorough evaluation of alternative approaches for addressing the nuclear waste problem. Such an approach would have served to better inform Congress, the Executive Branch, and other affected parties of the true range of alternative approaches that are available for managing the nation’s spent fuel and high-level waste and allowed those other potential approaches to be compared and contrasted with the Proposed Action.

In discussing the provision of the 1982 Act that indicates DOE need not consider alternatives to geologic disposal, the Draft EIS references the 1980 EIS that selected deep geologic disposal as the preferred method for disposing of spent fuel and HLW. The Draft also refers to the National Academy of Sciences (NAS) endorsement of deep geologic disposal. The facility set forth in the Draft Yucca Mountain EIS and in more current DOE reports and design documents is not, however, consistent with the definition of a deep geologic repository. Geologic disposal, as envisioned by the 1980 EIS and the NAS, means that the geologic formation in which the waste is placed is the principal barrier to assure that the waste remains isolated for the required time. Under the 1980 EIS and NAS concept, engineered barriers such as the waste package, backfill, etc. were to provide redundancy for the system. It was never intended that such engineered barriers would be used to compensate for deficiencies in the geologic environment.

What the Draft EIS sets forth in the Proposed Action is the opposite of the concept of deep geologic isolation. DOE’s plans for Yucca Mountain place primary reliance for waste isolation on various engineered systems (i.e., hardware designed to compensate for the poor waste isolation characteristics of Yucca Mountain itself). In order to make the site meet the radiation exposure standards, the engineered facility at Yucca Mountain

requires waste packages designed to last for at least 100,000 years, continuous titanium drip shields placed over the waste packages, special absorbent materials inside the waste packages, and numerous other engineering “fixes” that have evolved over the years in response to findings about the poor quality of the site itself. Such engineered barriers would be acceptable if they were used solely for redundancy. However, when they become the primary waste isolation system, the facility is no longer a geologic repository in the sense envisioned by the 1980 EIS and the NAS.

Given the almost full reliance on engineered barriers for waste isolation, the Yucca Mountain facility would perform just as well in an above ground industrial building. The performance calculation results would likely be about the same.

Since the Nuclear Waste Policy Act specifically requires that DOE pursue geologic disposal for the nation’s spent fuel and high-level radioactive wastes, and since the definition of geologic disposal is derived from DOE’s own 1980 EIS and prior and subsequent findings of the NAS, the Draft EIS and the Proposed Action it is intended to support are in violation of the spirit and the letter of that Act.

#### Page 2-70; Section 2.3.2 - Repository Design Alternatives Eliminated From Detailed Study

The Draft EIS should acknowledge and describe the two factors that have served to eliminate a whole suite of potential repository designs and have driven the current general design concept. The two factors are: 1) the discovery of rapid infiltration and flow of water in fractures in the unsaturated zone (contrary to the original conceptual model of very slow porous flow downward through Yucca Mountain), and; 2) the incorporation of large, horizontally emplaced waste packages in drifts required by the now-defunct development of the Multi-Purpose Container that replaced the concept of thin-walled stainless steel, vertically emplaced waste packages. These factors together reflect the finding that a Yucca Mountain repository system must rely on a robust engineered barrier system because the natural barriers of the site are not capable of providing significant waste isolation alone. The key design requirement that is central to Yucca Mountain repository performance is a waste package that has a projected long life relative to the regulatory compliance period.

#### Page 2-70; Section 2.3.3 - Nevada Transportation Alternatives Eliminated from Detailed Study

See comments below on Section 6 of the Draft EIS.

#### Page 2-72; Section 2.3.3.2 - Potential Highway Routes for Heavy-Haul Trucks and Associated Intermodal Transfer Station Locations Considered but Eliminated from Further Detailed Study

DOE eliminated the development of a new road for heavy-haul trucks from further detailed evaluation because the construction of a new branch rail line would be only slightly more expensive and transportation by rail would be safer (no intermodal transfers) and more efficient (TRW 1996, page 6C7). The analysis cited is based on the constraints for grade and curvature used for heavy-haul vehicles designed for highway use. DOE did not consider the feasibility of adapting trucks designed for heavy-haul in mining activities to the transport of spent fuel casks. These vehicles have the advantage of being able to handle extremely heavy loads (up to 400,000 tons) without the constraints on grade and degree of curvature required for vehicles designed for highway transport. Allowing significantly increased grades, sharper curves, and different surfacing materials (e.g., gravel) could significantly reduce the cost of constructing dedicated heavy-haul roads.

Page 2-74; Section 2.4.1 - Proposed Action and No-Action Alternative

This section of the Draft EIS concludes that “analyses showed that the environmental impacts associated with the Proposed Action would be small ...” This statement is not supported by the data and assessments in the Draft EIS. As discussed in comments relative to Sections 4, 5, and 6 of the Draft EIS (below), data that DOE ignored and/or analyses they failed to undertake clearly indicate that the impacts associated with the Proposed Action could be substantial. These impacts would affect people and the environment in Nevada and in cities and communities across the country and would be costly in monetary terms and in terms of human health, safety, and well-being.

Page 2-74; Section 2.4.2 - Short-Term Impacts of Repository Construction, Operation and Monitoring, and Closure

The Draft EIS states that the “estimated short-term (to 100 years) costs for the Proposed Action would be about \$29 billion, and those for the No-Action Alternative would be as much as \$57 billion for the same period.” This statement is not only inaccurate, but gratuitous. As shown in Attachment T, the actual costs for implementing the Proposed Action will be almost \$54 billion, even without many of the costly engineered fixes and alternatives that DOE has added to the project in the past two years. Furthermore, the analysis of the unrealistic No-Action Alternative scenarios provides no basis for comparison with the Proposed Action. The cost of storing spent fuel and HLW at generator sites, in the absence of a repository or central storage facility, would be closer to \$4 to \$5 billion (see discussion of on-site storage in Attachment T).

Page 2-74; Section 2.4.3 - Long-Term Impacts of the Proposed Action and the No-Action Alternative

Because the No-Action scenarios presented in the Draft EIS are unreasonable and unrealistic, the comparison of impacts with the Proposed Action represents a meaningless exercise and should be eliminated. Unless DOE decides to re-scope the EIS and identify a realistic and feasible No-Action Alternative, the type of comparison attempted in this section of the Draft EIS serves no useful purpose.

Page 2-75; Table 2-7 - Impacts Associated with the Proposed Action and No-Action Alternative

Long-term air quality: It is possible that there would be carbon-14 releases to the air from the postclosure repository. It is incorrect to say there would be no air releases.

Because the No-Action Alternative scenarios are, as stated previously, unrealistic and unreasonable, comments on the No-Action Alternative scenario impacts listed in Table 2-7 will not be provided.

Page 2-77; Table 2-7 cont.

Utilities, energy, materials, and site services: The impacts of enhancing the electric power delivery system to the Yucca Mountain site should be considered both on-site and off-site, if new transmission facilities are required. Section 3.1.11.2, Utilities, does not provide information on pages 3-89 to -92 on expected electric power use. It only speaks to current availability to the NTS and historical use by Yucca Mountain project activities.

Page 2-79; Section 2.4.4 - Impacts of the Transportation Scenarios

See comments on Section 6 of the Draft EIS (below).

Page 2-79; Section 2.4.4.1 - National Transportation

The summary of national transportation impacts is based on inadequate and incomplete data and analyses and does not reflect the impacts posed by the Proposed Action to people, communities, and the environment along national shipping routes. Since specific routes are never identified, analyses of impacts to at-risk communities are never attempted in the Draft EIS. No effort is made to identify and evaluate the potential for substantial socioeconomic impacts in corridor states and communities (see comments relative to Sections 4, 5, and 6 below). The use of fatalities (either latent cancer fatalities (LCFs) or accident fatalities) as the measure of transportation impacts is inadequate and serves to grossly understate the full range of negative impacts on people and the

environment associated with the Proposed Action. As noted in subsequent comments, the models and assumptions used to generate LCFs, transportation accident rates, and accident probabilities and severity are deficient and understate the consequences of a national shipping campaign of the size, complexity, and duration needed to implement the Proposed Action. In addition, entire categories of potential impacts (such as socioeconomic impacts, morbidity, quality of life, etc.) are simply ignored.

Page 2-80; Section 2.4.4.2 - Nevada Transportation

The analyses and data contained in the Draft EIS are inadequate to support the conclusion that environmental impacts for each of the ten implementing alternatives for waste transportation in Nevada would be small. The State of Nevada's evaluation (see comments relative to Section 6 of the Draft EIS) shows that risks and impacts could be substantial; that DOE has ignored key areas of potential impacts altogether; that spent fuel and HLW transportation could be major drivers of a wide range of socioeconomic, health and safety, and environmental impacts; and that impacts would affect individual communities and the State as a whole.

Page 2-81; Section 2.4.4.2 - Nevada Transportation

The Draft EIS states, "With the exception of Land Use, differences in environmental impacts for the ten implementing alternatives related to incoming shipments by rail would be small, so environmental impacts do not appear to be a major factor in the selection of transportation mode, route, or corridor in Nevada for incoming rail shipments." This statement is inaccurate. Rail operations associated with heavy-haul shipments present major problems for the operational highway network in Nevada. The Draft EIS ignores such impacts as traffic queuing, failing structural sections, remedial actions for reducing traffic accidents, and institutional anomalies (such as providing a portable crane capable of lifting overturned vehicles and casks).

Page 2-81; Section 2.4.4.2 - Nevada Transportation

The statement in the Draft EIS that environmental impacts for each of the 10 implementing Nevada transportation alternatives would be small is unsupportable. As discussed in these comments, DOE has failed to develop sufficient information on the description of the Proposed Action to adequately characterize the environmental impacts for Nevada transportation. In many cases, DOE's impact analysis is also based upon incomplete or missing environmental data due to the cursory analysis conducted on the potential transportation corridors. DOE has also incorrectly dismissed some identified impacts as minor (e.g., impact on crucial wildlife habitats). Therefore, the conclusion that the environmental impacts would be small is not a valid conclusion.

Similarly, the statement made in the second bullet on page 2-81 cannot be supported. That statement reads, “With the exception of land use, differences in environmental impacts for the 10 implementing alternatives related to incoming shipments by rail would be small, so environmental impacts do not appear to be a major factor in the selection of transportation mode, route, or corridor in Nevada for incoming rail shipments.”

As discussed above, DOE has not adequately assessed the environmental impacts of the 10 implementing alternatives. Therefore, it is not possible to draw the conclusion that the difference in environmental impacts are not a major factor in the selection of the transportation mode, route, or corridor. Furthermore, DOE has identified significant differences in land use impacts that should be a major factor in this decision. Therefore, this conclusion is not valid.

#### Page 2-81; Section 2.5 - Collection of Information and Analyses

This Draft EIS should be reissued when all the information on which it is based is available, complete, and of defensible quality.

#### Page 2-82 and page 2-83; Table 2-9 - Comparison of Impacts for Nevada Rail Implementing Alternatives and for Legal-Weight Truck Shipments

In this table, DOE attempts to provide a comparative summary of the impacts of the Nevada rail versus legal-weight truck alternatives. However, without rail access or heavy-haul shipments, there is no identified means of making over 300 shipments of naval spent fuel to the proposed repository. Therefore, any comparisons in this table are not valid, since they are not based on a complete description of the Proposed Action and thus, do not include a complete summary of the potential impacts.

#### Page 2-86; Section 2.5.1 - Incomplete or Unavailable Information

The text under this section states that “some of the analyses in the Draft EIS had to use incomplete information.” In fact, *most*, if not all, of the analyses are based on incomplete and, in some cases, deficient information. (See comments on Sections 3, 4, 5, and 6 of the Draft EIS.) The State of Nevada does not consider the information contained in the Draft EIS and used in the analyses to be adequate or sufficient to support the conclusions regarding the potential for and severity of impacts.

Most of the analysis of impacts on the Nevada transportation alternatives is based upon incomplete or missing information. This is primarily due to DOE’s failure to select a preferred alternative and a reasonable number of alternatives for Nevada transportation. The Council on Environmental Quality regulations cited, however, do not allow DOE to

make a NEPA decision based on this incomplete or unavailable information. The CEQ regulation cited by DOE states:

- (a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.
- (b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
  - 1. a statement that such information is incomplete or unavailable;
  - 2. a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
  - 3. a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
  - 4. the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

Since the information needed to make an informed decision on the transportation impacts is neither exorbitant in cost to obtain nor unobtainable, paragraph (a) above is applicable. The information necessary to make an accurate assessment of the Nevada transportation should be obtained and should be included in an environmental impact statement prior to any agency decision.

This section and, in particular, the statement, "In addition, DOE might not complete some of the studies and design development for the repository until after it has issued the Final EIS" is not consistent with the requirements of the NWPA. Upon completion of site characterization (Sec. 114(a)(1), the Final EIS will accompany the Secretary's Site

Recommendation Report. That report is to include, among other things, "a description of the proposed repository, including preliminary engineering specifications for the facility" (Sec. 114(a)(1)(A)). Based on this information, the Draft EIS is not only insufficient pursuant to NEPA, but it is also not in compliance with the NWPAA.

Page 2-86; Section 2.5.2 - Uncertainty

The statement that "the results and conclusions of analyses often have some associated uncertainty" is a huge understatement. Every aspect of the Yucca Mountain program is characterized by massive uncertainties. There is pervasive uncertainty regarding the design of the repository facility - surface and subsurface. There is major uncertainty associated with assessments of waste isolation performance, uncertainties that are compounded by the substitution of assumptions and judgement for unavailable data. Almost every aspect of the transportation system is rife with uncertainties that the Draft EIS does little or nothing to reduce. There is inherent uncertainty in all of the risk calculations and models, as well as in the predictions of radiation exposures from project activities. In short, uncertainty is a defining characteristic of the Yucca Mountain program.

This uncertainty itself can create impacts and be a factor that leads to the amplification of impacts that might occur. How DOE handles uncertainty in the design and construction of the repository could result in overly optimistic assumptions for waste isolation capabilities and lead directly to greater radiation exposures in the future and higher incidence of accidents. The Draft EIS should have addressed the issue of uncertainty as a fundamental characteristic of the Proposed Action and assessed what effects and impacts could be expected from a program with such unprecedented and unmitigated levels of uncertainty.

As presented in this Draft EIS, the uncertainties from all sources, both in repository performance and system design, as well as environmental impacts, are of such range and magnitude that a decision to select the preferred alternative cannot be supported by this document.

Page 2-87; Section 2.6 - Preferred Alternative

The text in this section states that "The analyses in this EIS did not identify any potential environmental impacts that would be a basis for not proceeding with the Proposed Action." The text goes on to say that "DOE has not chosen any transportation mode, corridor, or route as preferred at this time."



The information and analyses contained in the Draft EIS are insufficient and so burdened by uncertainty, assumption, and speculation that they do not support DOE's conclusion of no impact (see comments on Sections 4, 5, and 6 of the Draft EIS). In addition, the selection of transportation modal mix, rail or heavy-haul corridors, intermodal facility decisions and locations, and national and Nevada highway and rail routes are integral aspects of the Proposed Action, as set forth in the Draft EIS and in practical and operational terms. It is entirely inappropriate for DOE to conclude the Proposed Action poses no significant environmental impacts when decisions on critical and inseparable elements of that Action are being postponed to some undefined future time.

The Draft EIS must consider the Yucca Mountain program in a holistic sense. If the preferred alternative is to proceed with a repository at Yucca Mountain, then the analyses associated with that alternative must include the complete set of actual elements that make up the Proposed Action. It is no more possible to separate the surface facilities for the proposed repository from the subsurface facility, than it is to separate the transportation system components from the waste acceptance and disposal systems. It takes the entire package to implement the Proposed Action, and each of the components must be described and analyzed with sufficient detail and specificity to enable an adequate identification and assessment of impacts. That cannot occur when large elements of the Proposed Action are left undefined.

The Council on Environmental Quality regulations require that the agency preparing the EIS "[i]dentify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference" (40 CFR 1502.14(e)). DOE admits that it has not chosen the preferred transportation alternative at this time and that when it does, additional field surveys, state and local government consultations, environmental and engineering analyses, and National Environmental Policy Act reviews will be required. DOE's own guidance document on the preparation of environmental impact statements also cautions against improper segmentation of connected actions and directs that connected actions should be considered together in a single NEPA document. It specifically recommends that DOE "include transportation activities as part of the proposed action when the transportation activities would be necessary to make the action happen" (*Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, U.S. Department of Energy, Office of NEPA Oversight). The disposal of waste at the proposed repository cannot happen without transportation. Therefore, DOE should have included a preferred transportation alternative within the Draft EIS and conducted all of the necessary analyses to reach a decision.

### SECTION 3. AFFECTED ENVIRONMENT

#### Page 3-1; Section 3.1 - Affected Environment at the Yucca Mountain Repository Site at the Conclusion of Site Characterization Activities

Section 3.1 defines the affected environment as it was at the end of site characterization. The documentation is in several environmental baseline files. This approach ignores and circumvents the issue that an environmental baseline did not exist prior to site characterization and, therefore, no impacts of that phase could be evaluated. Thus, for the Draft EIS, the affected environment was as it stood after being impacted by site characterization, with the absence of a true, undisturbed baseline as intended by NEPA regulations. The importance of pre-disturbed baseline information in the Environmental Impact Assessment and NEPA processes is discussed in Attachments A, B, D, E, F, and G.

#### Page 3-2; Section 3.1 - Affected Environment and the Yucca Mountain Site at Conclusion of Site Characterization Activities

The baseline information description for the “socioeconomic environment” in the Yucca Mountain region, as reflected in the Draft EIS, is inadequate and deficient. As documented in comments relative to Draft EIS Sections 3, 4, and 5, baseline information relative to socioeconomic conditions must include information by which impacts on the State’s major industrial sectors can be measured. Such baseline information would include information on tourism and tourism-related industries; business and industrial relocations and economic development activities; image data relative to how Nevada and Las Vegas are perceived and the vulnerability of these images to Yucca Mountain related activities; State and local government revenues generated from tourist-related sources (gaming, taxes, sales taxes, room taxes, etc.); and other related information.

#### Page 3-3; Table 3-1 - Regions of influence for the proposed Yucca Mountain repository

The Draft EIS inappropriately defines regions of influence in an overly narrow and restrictive manner that serves to disenfranchise important affected populations. The region of influence for “cultural resources” is described in Table 3-1 as “land areas that the proposed repository would disturb ... and areas in the analyzed land withdrawal where impacts could occur.” The actual area for potential cultural resource impacts from the project is much broader than this narrow definition. The region of influence should include all Native American communities potentially affected by the repository or by repository-related nuclear waste transportation. This includes not only cultural sites within narrow “disturbed” areas or within the 230 square mile proposed land withdrawal,

but also tribes, reservations, and communities impacted by rail or highway transportation routes.

In addition, the cultural resources region of influence must include both Native American communities and sites of religious or historic significance along specific transportation routes. The Proposed Action is an undertaking that is national in scope and encompasses, as an integral and inextricable part of the program, a system of national highway, rail, and barge routes that must be analyzed for areas of important cultural resources, especially those relating to Native peoples and cultures.

Table 3-1 also unnecessarily and inappropriately truncates the “socioeconomic environment” region of influence by limiting it to Clark, Lincoln, and Nye Counties. Even the incomplete and overly general analyses contained in later sections of the Draft EIS acknowledges that a number of other counties will be affected, primarily by rail spur development and operation; intermodal facility siting, construction, and operations; heavy-haul truck transportation; and highway transport of spent fuel and HLW waste. In addition, the State of Nevada, as a whole, will be affected by repository activities from impacts on the State’s major industries, impacts to the State revenue base, and impacts to State agencies that have responsibilities for repository activities (highway regulation/maintenance, law enforcement, emergency management/response, etc.).

Since the Proposed Action encompasses a national radiological materials shipping campaign of unprecedented proportions, duration, geographic scope, and potential impacts, the socioeconomic environment region of influence should also include cities and communities located along all of the specific national transportation routes. Attempting to constrict the region of influence for the Proposed Action is inappropriate and renders the Draft EIS deficient in its scope and approach to impact identification and assessment.

#### Page 3-7; Section 3.1.1.3 - Potential Repository Land Withdrawal

This section does not provide a substantive rationale for the size and dimensions of the proposed withdrawal area. It also does not discuss the necessity for the inclusion of the one square kilometer parcel of private land, which is an operating patented mining claim and water supply well adjacent to Highway 95.

In the first paragraph in this section, the Draft EIS fails to qualify the statement “Because all of these lands are not under permanent DOE control, a land withdrawal would be required.” The Draft EIS provides limited information about the current “non-permanent” withdrawal status of the referenced DOE lands that would encompass a repository land withdrawal. Specifically, the Draft EIS should describe the current

withdrawal status of DOE-controlled lands within Area 25 of the NTS and adjacent Air Force-controlled lands (i.e., the lands on the NTS and the Nellis range that would be necessary to support a repository at Yucca Mountain). The Draft EIS should also address any environmental management sites within the proposed land withdrawal area, including Area 25, that would be subject to DOE long-term stewardship.

Page 3-9; Table 3-4 - Current land ownership and public accessibility to the analyzed land withdrawal area.

Except for the one patented mining claim referenced in this table, the title of the table is incorrect and misleading. While the patented mining claim may be “owned” by a private party, none of the remaining lands given in the table are under federal ownership. All of the lands defined in the table, except for the one mining claim, are public lands. The title of the table should be changed to reflect the lands under public ownership, albeit temporarily withdrawn for federal use.

Page 3-12; Section 3.1.2.1 - Air Quality

Were data collected since 1995 on air quality? If so, why wasn't it presented here? If not, why not?

Page 3-21; Section 3.1.3.1 - Physiography (Characteristic Landforms)

There is uncertainty associated with the age of the last eruption of the Lathrop Wells cone. The range of the uncertainty should be stated here.

Page 3-24; Section 3.1.3.1 - Physiography (Characteristic Landforms): Selection of Repository Host Rock

The discussion on the repository host rock should indicate that, during construction of the ESF, more significant ground support methods than originally expected were required to achieve “stable openings.”

Page 3-24; Section 3.1.3.1 - Physiography - Potential for Volcanism at the Yucca Mountain Site

Again, there is uncertainty associated with the age of the Lathrop Wells volcano. The latest activity could have been thousands of years more recent than the 75,000 year age indicated.

Page 3-25; Section 3.1.3.1 - Physiography - Potential for Volcanism at the Yucca Mountain Site

The estimated probability of a dike disrupting the repository during the first 10,000 years after closure has uncertainty associated with it. The expert panel members' estimates of the annual probability ranged over about three orders of magnitude, and the probability indicated here represents an aggregation of the members' estimates.

Page 3-29 to 30; Section 3.1.3.3 - Modern Seismic Activity - Seismic Hazard

Given the large uncertainty in fault lengths shown in Table 3-8, there should be a discussion in the text regarding the uncertainty that this introduces into the estimates of seismic risk.

The Final EIS should include the updated results of Dr. Wernicke's research relative to tectonic deformation and make any necessary adjustments in seismic and volcanic risk estimates.

Page 3-30; Section 3.1.3.4 - Mineral and Energy Resources

The EIS should show the locations of existing mining claims in the proposed withdrawal area, despite DOE's belief that economic mineral potential of the area is low.

Page 3-31; Section 3.1.3.4 - Mineral and Energy Resources

The text should read, "...no **currently** economic deposits.." As any geologist will tell you, technology and demand can change a currently uneconomical deposit into an economical one almost overnight.

Page 3-31; Section 3.1.4.1.1 - Regional Surface Drainage

The Draft EIS does not contain any information regarding potential discharge of contaminated groundwater that would not meet either the Nevada Water Quality Standards or the California Water Quality Standards. The Draft EIS should be reissued to include a discussion on the potential for migration of contaminants in the groundwater and possible discharge at points in Nevada and California. The question of whether this discharge would meet both Nevada's and California's Water Quality Standards should also be addressed.

Page 3-36; Section 3.1.4.2 - Groundwater

The statement that there is a “firm basis of understanding of the hydrology of the region.” is true only in DOE’s eyes. There is still controversy over which direction the groundwater flows and how fast. Also, the cause of the large hydrologic gradient immediately north of Yucca Mountain has not been determined. In addition, uncertainties related to groundwater flow patterns from Pahute Mesa into Forty-Mile Wash and the relationship to groundwater movement beneath Yucca Mountain should also be discussed in the Draft EIS.

Page 3-38; Section 3.1.4.2.1 - Regional Groundwater

Figure 3-13 should depict the entire Death Valley Regional Groundwater Flow System, not just a portion of the system, and include the associated groundwater flow paths. The Draft EIS states that the Death Valley Regional Groundwater Flow System is a closed system with groundwater not leaving the system except by evapotranspiration. Figure 3-13 should graphically show this.

Page 3-39; Section 3.1.4.2.1 - Regional Groundwater

The distribution of infiltration across the Yucca Mountain block is questioned. The distribution of infiltration used in the Draft EIS is highest at the crest. There are indicators which would suggest that peak infiltration is on the western flank of the mountain block. Infiltration in this western block region may be underestimated and its effect unknown.

Only the water quantity for the low thermal load is given here. What is the quantity for the intermediate and high thermal loads, and why were the data not given?

Page 3-41; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

What would be “sufficient quantities of water” for DOE to collect? There are more than a few places in the ESF that dripped water.

Page 3-42; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

Is perched water found only below the proposed repository horizon?

Why wasn’t Chlorine 36 also used here, along with tritium?

Page 3-46; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

Water Source and Movement: The description of the significance of Chlorine-36 in determining the age of subsurface water and in estimating the time it takes water to travel from the surface, through the repository horizon, and into the aquifer below is misleading. The real significance of the Chlorine-36 studies is that it has been conclusively demonstrated that the travel time for water to move from the surface of Yucca Mountain to the repository horizon is less than 50 years. The entire Chlorine-36 discussion in the Draft EIS appears intended to obscure this fact.

Define and quantify “relatively rapid water movement.”

Define and quantify “very small amounts” of fallout. What is the basis for the assumption of “very small amounts” of fallout?

Page 3-47; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

Give the best estimate of groundwater travel time, not just less than 10,000 years.

Page 3-49; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

The Draft EIS should discuss more fully the fluid inclusion work on the calcite and opal veins and coatings underway at UNLV. The Draft EIS contains a brief discussion of the controversy over evidence that hydrothermal activity may have occurred at Yucca Mountain in the past and could reoccur during the lifetime of the repository. The text gives the misleading impression that this matter has been resolved in DOE’s favor as a result of a NAS review of the issue. In fact, the issue is the subject of an ongoing joint study being implemented by the University of Nevada Las Vegas, DOE, and the State of Nevada. Preliminary indications from data and analysis emerging from this study indicate that fluid inclusions found in calcite-silica deposits at depth within the exploratory tunnel at Yucca Mountain are of hydrothermal origin. Work is ongoing to confirm this finding and to discover the age of the fluid inclusions. The outcome of this study has significant implications for the suitability of Yucca Mountain as a repository site and for the viability of the Proposed Action as described in the Draft EIS.

Page 3-51; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

The discussion about the lack of data on the lower carbonate aquifer is another indication of the deficiencies of the Draft EIS. Single borehole tests are meaningless in this context. More testing should be performed to corroborate this data before using it in analyses and conclusions for the Draft EIS.

Page 3-52; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

Provide the actual feet/mile or meters/kilometer for the slope of the water table east of the Solitario Canyon fault.

Page 3-53; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

The use of the word “probably” in the third paragraph on this page does nothing but cause one to doubt the veracity of the statement.

Why is the average net infiltration rate on this page given as 4.5 millimeters over 220 square kilometers but on page 3-44, it is given as 4.5 millimeters over 230 square kilometers? Also, why wasn’t the infiltration rate for the repository area used instead of the rate from the larger study area?

The statement that the groundwater pathway beneath Yucca Mountain is southerly conflicts with Figure 3-13 and other figures used in various DOE presentations that show an initial eastward flow of the groundwater, then down Fortymile Wash.

Page 3-54; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

Define and quantify the term “small” as used in the sentence regarding the volume of water pumped from USW VH-1.

Page 3-57; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

The values in Table 3-17, Water chemistry of volcanic and carbonate aquifers at Yucca Mountain, are basically meaningless for comparison since, by DOE’s own admission, the values shown for the lower carbonate aquifer all come from one well. (See comment for page 3-51.)

Page 3-59; Section 3.1.4.2.2 - Groundwater at Yucca Mountain

Define the “active life of the repository.”

Page 3-59; Section 3.1.5 - Biological Resources and Soils

This section only briefly addresses Biological Resources and Soils, referring to the *Environmental Baseline Files* (TRW 1999k and TRW 1991). The discussion in this section omits the physical environment that, together with the biological components, comprise the ecosystem involved. Ecosystems are not discussed at all, and that level of



ecological organization is ignored. The same is true for the discussions of Biological Resources related to transportation on pages 3-107 and 3-127. With respect to ecosystems, the Draft EIS states on page 3-59 that many of its studies for this aspect of the document “....did not use an integrated ecosystem approach and, therefore, are of little value for evaluating impacts of the repository.” This deficiency negates the sufficiency and credibility of the biological and ecological aspects of the entire Draft EIS. Further discussion of this matter appears in Westman (1985), Wiesner (1995), Salk and others (1998), Caldwell (1998), Clark and Canter (1997), Ortolano (1997), Gilpin (1997), and Bartlett and Malone (1993), as well as in Attachments D, E, F, and N to these comments.

#### Page 3-68; Section 3.1.6.2 - Native American Interests

The treatment of Native American issues and impacts in the Draft EIS is entirely inadequate. The Draft EIS ignores potential impacts to Native communities from the transportation of spent fuel and HLW, both in Nevada and nationally. It presents a sanitized section on “Native American Views of the Affected Environment” (Page 3-70), but fails to reflect the strong and ubiquitous opposition to the Yucca Mountain program on the part of Native peoples in Nevada and California.

The Draft EIS fails to reflect that most Native Americans in Nevada see the unwanted disturbance of cultural resources as the inevitable outcome of the Yucca Mountain project. While mitigation of disturbed archaeological sites is seen by some as a marginally acceptable alternative, most would prefer that no disturbance take place at all.

The discussion also fails to recognize that the Native American tribes in the immediate vicinity of the Yucca Mountain project area and along potential transportation routes are, for the most part, economically disadvantaged. Reservations and communities in Nye, Lincoln, and Inyo counties are rural and isolated and either lack a land base or have land bases too small to support their populations by ranching or other locally common means. A large number of people are unemployed, underemployed, and/or are living below the poverty level. Educational levels have improved in recent years, but without job opportunities in local communities, people must leave to take advantage of their training. Any negative statewide economic impacts associated with or caused by the repository or repository-related nuclear waste transportation will have a disproportionate impact on such communities because of these depressed baseline conditions.

The Draft EIS is completely silent on Native American communities and interests that will be affected by the transportation of spent nuclear fuel and HLW nationally. There are numerous areas of reservation lands and Native communities located along potential highway and rail shipping routes. However, since the Draft EIS does not explicitly identify those routes, DOE has chosen not to address Native American (or any other)

issues or impacts in communities outside Nevada. This is a major legal and substantive deficiency of the Draft EIS.

Page 3-71; Section 3.1.7 - Socioeconomics

The Draft EIS fails to adequately describe the socioeconomic environment at risk of significant impacts from the Proposed Action. The Draft fails to describe the environment with respect to Nevada's major economic sector and discuss why the State's tourism-based economy is especially vulnerable to impacts associated with the proposed Yucca Mountain facility and related transportation of spent fuel and HLW. As noted in comments relative to Sections 4 and 5 of the Draft EIS, the State of Nevada, affected local governments in the State, the Nevada University System, and DOE's own contractors have identified tourism, economic development, business in-migration, and related areas as being potentially vulnerable to the extraordinarily negative and stigmatizing characteristics of high-level nuclear waste facilities and activities. The Draft EIS is deficient in not including these areas in its definition of the socioeconomic environment and comprehensively addressing potential impacts in subsequent sections of the document.

A considerable body of research was compiled by the State of Nevada between 1986 and 1998 and was available to DOE for use in preparing the Draft EIS. The State's comments on DOE's 1995 Notice of Intent to prepare an environmental impact statement for the Yucca Mountain program set forth a comprehensive description of the available research, data, and findings. The Draft EIS completely ignores this work and fails to address the most significant and far reaching areas of likely socioeconomic impacts.

A complete and in-depth treatment of the impact studies and their findings can be found in three major summary reports on Nevada socioeconomic studies published in 1989, 1993, and 1995, respectively.<sup>23</sup> In addition, two major books dealing with the policy implications related to the findings of Nevada's socioeconomic research have been published by the State of Nevada's study team.<sup>24</sup> The State's Technical Review Committee has also issued two reports based on the State's findings, and a summary of

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<sup>23</sup> Ref. (1) "An Interim Report on the State of Nevada Socioeconomic Studies," (June, 1989); (2) "State of Nevada Socioeconomic Studies of Yucca Mountain 1986 - 1992: An Annotated Guide and Research Summary," (June 1993); and (3) "State of Nevada Socioeconomic Studies Biannual Report: 1993 - 1995," (June, 1995).

<sup>24</sup> Ref. One Hundred Centuries of Solitude, by James Flynn, et al., Westview Press, Boulder, Colorado (1995); and The Dilemma of Siting a High-Level Nuclear Waste Repository, by D. Easterling and H. Kunreuther, Kluwer Academic Publishers (1995).

the Nevada research was published in the *Proceedings* of the National Academy of Sciences.<sup>25</sup>

As noted in comments on Section 3.1 above, the Draft EIS inappropriately restricts the “region of influence” to three Nevada counties (Clark, Nye, and Lincoln). The region of influence must also include counties and areas affected by rail spur development and operation; intermodal facility siting, construction, and operations; heavy-haul truck transportation; and highway transport of spent fuel and HLW waste. In addition, the State of Nevada, as a whole, will be affected by repository activities in terms of impacts on the State’s major industries; impacts to the State revenue base; and impacts to State agencies that have responsibilities for repository activities (highway regulation/maintenance, law enforcement, emergency management/response, etc.).

Since the Proposed Action encompasses a national radiological materials shipping campaign of unprecedented proportions, duration, geographic scope, and potential impacts, the socioeconomic environment region of influence should also include cities and communities located along all of the specific transportation routes nationwide. Attempting to constrict the region of influence for the Proposed Action is inappropriate and renders the document deficient in its scope and approach to impact identification and assessment.

#### Page 3-76; Section 3.1.7.3 - Payments Equal to Taxes

The Draft EIS briefly discusses the Payments Equal to Taxes (PETT) paid to State and local governments under Section 116 of the Nuclear Waste Policy Act. It is unclear what purpose this discussion serves since it is not part of a larger description of State and local revenues. The Draft EIS should have described the status of State and local government revenue systems (of which PETT is a very small element) as a basis for examining the potential impacts of the Proposed Action on State and local government finances. As noted in comments on Section 4 of the Draft EIS, the proposed Yucca Mountain project has the potential to result in significant impacts to Nevada’s tourism-based economy, leading to fewer tourist visits and to reduced gaming, sales, room, and related taxes. Because of the State’s unique revenue system and the way sales and gaming taxes are collected and distributed to local governments, even a relatively small decline in tourism can have significant impacts to State and local government revenues. An understanding

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<sup>25</sup> Ref. “Interim Statement of the Technical Review Committee on the Yucca Mountain Socioeconomic Project,” by G. F. White, et al. (January, 1990); “Nuclear Waste’s Human Dimension,” by K. Erikson, et al., in *Forum for Applied Research and Public Policy*, Fall, 1994; and “Socioeconomic Studies of High-Level Nuclear Waste Disposal,” in *Proceedings of the National Academy of Sciences*, Vol. 91, pp. 10786 - 10789, November, 1994.

and explication of Nevada's unique revenue system is a prerequisite for carrying out any meaningful socioeconomic impacts assessment

Page 3-79; Section 3.1.8 - Occupational and Public Health and Safety

It is known that there is some high-level waste residue from the nuclear rocket program buried at an unknown location in Area 25 of NTS. The Draft EIS must contain affirmative information regarding its location and assure that, if it is in the proposed withdrawal area, it will be recovered and managed according to applicable laws, regulations, and orders. Also, there are reportedly some 20 contaminated sites within the portion of Area 25 of the NTS that is included in the proposed withdrawal area. Before issuance of a Final EIS, these areas must be fully rehabilitated under the jurisdiction of NTS so they are not passed on to OCRWM where they would remain a continuing hazard.

Page 3-83; Section 3.1.8.2 - Radiation Environment in the Yucca Mountain Region

This section references *Bechtel 1998, page 7-5*, the Annual Site Environmental Report for the Nevada Test Site. All of the off-site radiological doses in this report are given as EDE, effective dose equivalents. EPA's Clean Air Package 1988 (CAP-88 PC) program was used to calculate the doses. The dose being calculated is actually the committed effective dose equivalent (CEDE) and should not be given as an EDE.

Page 3-93; Section 3.1.12.4 - Existing Low-Level Radioactive Waste Disposal Capacity

The implication is given that repository-generated low-level waste might be disposed at the NTS low-level waste disposal site. Currently, the Yucca Mountain Project is not authorized to use this disposal site. If the repository is developed as planned, the low-level waste generated will not be considered NTS on-site generated waste. Therefore, as suggested in other sections of this Draft EIS, DOE should plan for the low-level waste generated at the repository to be shipped off-site to a commercial disposal site. See also comment for page 4-18; Section 4.1.12.2

The Final EIS should update the status of available and proposed commercial low-level waste disposal facilities.

Page 3-98; Section 3.2.1 - National Transportation

The description of the affected environment related to the national transportation system for spent fuel and HLW is substantively and legally deficient. The description in the Draft EIS is wholly inadequate as the basis for assessing impacts. The affected

environment for transportation must include the *specific* communities along the *specific* transportation routes identified for the shipment of spent fuel and HLW to Yucca Mountain. This information exists, as do the analytical tools for identifying specific routes, and should have been included in the Draft EIS.

The statement in the last sentence of the second paragraph that “no new land acquisition and construction would be required to accommodate these shipments” is misleading. There may well be additional land acquisitions and construction required once DOE identifies the specific shipping routes nationwide (something the Draft EIS fails to do). In the case of transuranic waste shipments to the Waste Isolation Pilot Plant in New Mexico, DOE agreed to pay for bypasses around/near Sante Fe and Roswell. There were also safe parking facilities that needed to be improved in other states. It is very likely that, once states and cities become aware of the nature, volume, and duration of the shipping campaign needed to support the Proposed Action, DOE will be forced to assist with the construction of bypasses or other infrastructure improvements.

In addition, the one hundred percent rail transportation scenario contained in the Draft EIS is impossible without substantial investments at reactor sites for infrastructure to accommodate large rail casks. Many reactor locations cannot currently accommodate these types of transportation casks. Information as to which generator sites will require such upgrades is available. The Draft EIS should have evaluated the costs and impacts of such improvements.

#### Page 3-99; Section 3.2.1.3 - Barge and Heavy-Haul Truck Transportation

As stated above, the Draft EIS does not address impacts to infrastructure at either end of the shipping stream (e.g., required improvements at reactor sites or highway upgrades in Nevada).

#### Page 3-99; Section 3.2.2 - Nevada Transportation

The Draft EIS fails to describe the affected environment for likely alternative highway routes within Nevada. In particular, the Draft EIS fails to describe and analyze the NDOT ‘B’ route that enters the State via I-80 at Wendover, proceeds south to Ely on US 93Alt/US93, then west to Tonopah on US 6, and south to Yucca Mountain via US 95. The NDOT ‘B’ route is considered to be the most likely alternative route to avoid the metropolitan Las Vegas area, and any analysis of Nevada transportation is inadequate if this route is excluded.

The description of the affected environment is also deficient because it does not include specific information for all specific communities and Native American reservations

potentially affected by the shipment of spent fuel and HLW. Such information should be included for every community along highway routes, main line rail routes, rail spur alternatives, and heavy-haul truck routes.

Page 3-100; Section 3.2.2.1 - Environmental Baseline for Potential Nevada Rail Corridors

The Draft EIS states: “DOE expects waste quantities generated by rail line construction and operation to be minor in comparison to those from repository construction and operation. As such, no discussion of existing waste disposal infrastructure along the routes is provided.” It is true that waste quantities generated by rail line construction and operation should be minor in comparison to those from repository construction and operation. The comparison, however, is meaningless. Most of the rail construction would take place far from the repository, much of it in remote, sparsely populated areas. Waste generated during the rail construction will undoubtedly not be hauled to the same disposal site as waste generated during repository construction. Rather, it will be disposed in facilities along the corridor.

What is significant, therefore, is the volume and type of waste generated by rail line construction and operation in comparison to the capacity of waste disposal facilities along the various corridors. Given the remote, sparsely populated areas crossed by the proposed rail line, solid waste disposal facilities probably do not have sufficient capacity to handle waste generated during rail construction. Many times construction waste is not compatible with the waste handling facilities at existing sites. (Note: This same discussion applies to the construction of intermodal transfer station and heavy-haul routes.)

Page 3-100; Section 3.2.2.1.1 - Land Use and Ownership

The definition of region of influence for land use is too narrow. Impacts to land use may occur that do not result in a change of ownership or use. For example, bisecting a ranch with a rail line will have substantial impacts on that operation. It will be difficult for the rancher to move equipment and livestock from one side of the rail line to the other. Because of the difficulty in operating the ranch that is now split into two pieces, the value of the ranch will be reduced. This will have significant impact on the rancher without changing the ownership or the use of the land. The region of influence for land use should include all of the land under the ownership or lease of agricultural operations that will be crossed. (Note: this same discussion applies to the intermodal transfer station and heavy-haul routes.)

The region of influence for biological resources is also too narrowly defined. Habitat outside the corridor is considered in the regional of influence only if that habitat is

disturbed by rail line construction and operations. Several of the corridors cross or pass near to crucial big game habitat. Human activity is known to reduce the value of crucial habitat, particularly crucial winter habitat. Frequent trains passing through or near to crucial habitat could significantly reduce the value of that habitat even though the habitat was not physically “disturbed” by construction or operation. The region of influence for biological resources should include all habitat potentially affected, not just disturbed, by construction and operation of the rail line (Note: This same discussion applies to the intermodal transfer station and heavy-haul routes.)

Page 3-112; Section 3.2.2.1.5 - Cultural Resources

Although archaeological inventories and testing have occurred at Yucca Mountain itself as part of site characterization activities, historic property surveys meeting the Secretary of Interior’s Standards have not been conducted for the railroad corridors. As the Draft EIS acknowledges, ethnographic studies for these corridors are lacking and must be conducted to identify sites to which a tribe might attach religious or cultural significance. Were any of the rail routes used historically as transportation routes? Direct impacts would occur as a result of the construction of lines, but the Draft EIS fails to note that historic or cultural landscapes might also be impacted as a result of this construction. Again, DOE needs to consult with the State Historic Preservation Office (SHPO) regarding the definition of this Area of Potential Effect (APE).

Additionally, the Programmatic Agreement (DOE 1988b, all), referenced in this section, regards site characterization activities solely and should not be used for the entire project. The programmatic agreement states that:

*Whereas, development of the repository and other facilities specified in the Nuclear Waste Policy Act are not within the scope of this Programmatic Agreement, but will be dealt with through additional consultation with the Advisory Council on Historic Preservation (Council) per the Council’s regulations “Protection of Historic Properties” (36 CFR Part 800 as revised on September 2, 1986) (Appendix 1);*

Amendments to the National Historic Preservation Act and subsequently to 36 CFR Part 800 necessitate a new agreement that includes Native Americans as signatories where the APE (as identified within the transportation systems) crosses the Moapa Indian Reservation and Las Vegas Paiute Indian Reservation. As per the new regulations, the SHPO is identified as a consulting party and should be involved in negotiations for a new programmatic agreement.

This section on cultural resources for the rail corridors provides insufficient data to determine location and numbers of historic properties. DOE needs to consult with SHPO to identify consulting parties and define an APE. DOE needs to prepare a new programmatic agreement that details how it will identify, evaluate, and treat historic properties and how the consultation process shall occur.

Page 3-113; Section 3.2.2.1.5 - Cultural Resources

Native American Interests: The Draft EIS states that, "... while transportation issues are of extreme importance to [Native Americans], at present they cannot provide specific comments on any of the Nevada transportation alternatives ... due to the absence of systematic ethnographic studies for any of the proposed project areas." Since the Draft EIS acknowledges at least the potential for significant impacts to Native American cultural resources, it is incumbent upon DOE to carry out the needed ethnographic studies as part of its work in preparation of the Draft EIS. DOE has had almost 17 years to do this work, and failure to do it should not exempt DOE from its obligations under NEPA. In addition, a considerable body of information exists as a result of research carried out by the State of Nevada between 1986 and 1998. This research was available to DOE at the time it was preparing the Draft EIS. Summaries of the State's Native American studies reports are found in Appendix II of these comments.

Page 3-114; Section 3.2.2.1.6 - Socioeconomics

The Draft EIS is deficient in its description of the socioeconomic component of the affected environment. The Draft EIS fails to include any description of socioeconomic conditions/factors at the State level that stand to be impacted by the Proposed Action. State-level revenues and expenditures, such as costs and other impacts to State agencies affected by the project (such as the State Department of Transportation, Department of Motor Vehicles and Public Safety, the State Health Division, and other agencies) and impacts to the State's major economic sector are all missing from the Draft EIS - either in Section 3 or in subsequent sections on impact assessment.

Please refer to previous comments regarding the inappropriateness of limiting the socioeconomic scope of the Draft EIS to just three counties in DOE's truncated "region of influence."

See detailed comments regarding the inadequacy of DOE treatment of socioeconomic conditions and impacts in comments on Section 4 of the Draft EIS.



Page 3-124; Section 3.2.2.2.3.1 - Surface Water

The paragraph on highway routes for heavy-haul trucks provides comments on the robustness of vehicle and cask but provides no evaluation of what would be needed if a flash flood overturned a shipment, spilling the cask off a truck or rail car. Lifting one hundred ton or larger casks requires a portable crane that does not exist in Nevada.

Page 3-129; Section 3.2.2.2.4 - Biological Resources

The second paragraph under the section dealing with the “Caliente Route” states that SR 375 intersects US 93; in fact, it is SR 318 that intersects US 93.

Page 3-133; Section 3.2.2.2.5 - Cultural Resources

The State Historic Preservation Office comments on highway corridors and intermodal transfer stations are the same for rail corridors. Insufficient data is presented to determine the location and number of historic properties. DOE needs to consult with SHPO to identify consulting parties and define an APE. DOE needs to prepare a new programmatic agreement that details how it will identify, evaluate, and treat historic properties and how the consultation process shall occur. In addition, the State requests responses to the following questions:

4. Has consultation with Native Americans proceeded regarding the highway systems and intermodal transfer stations?
2. Has DOE examined whether the use of highways has the potential to affect historic properties?

Page 3-134; Section 3.2.2.2.6 - Socioeconomics

The Draft EIS states: “Section 3.1.7 contains socioeconomic background information on the three counties (Clark, Lincoln, and Nye) most involved in the heavy-haul routes.” The section referenced contains very little information on the expected future population of these areas during the period of operations. To accurately predict the impact of heavy-haul operations, future population projections are necessary. These projections are required in order to forecast traffic volumes on the affected highways. Without these projections, the impact of operations on the level-of-service for the affected highways cannot be assessed. In the Las Vegas urban area, the area where growth is expected to occur given the proposed construction of urban area bypasses should also be projected. Highway improvements are known to affect growth patterns in urban areas. Without

projecting the change in growth patterns associated with the urban bypasses, the projected traffic volumes on these roads cannot be predicted.

The Draft EIS inaccurately concludes that “[t]he candidate heavy-haul intermodal transfer station sites and routes would not appreciably affect counties other than those in which the facilities were located.” This statement ignores the fact that heavy-haul transportation and the location of an intermodal transfer facility in Nevada would be primary impacts on public perceptions of risk and the stigmatizing effects of the Proposed Action. Impacts from heavy-haul transport and intermodal facility activities would be statewide. State-level impacts would accrue to State agencies required to respond to, or otherwise deal with, the shipments of waste and the operations of an intermodal transfer facility. The State’s principal economic sector could also be affected, with resulting impacts to State revenues and, due to Nevada’s unique taxation/revenue distribution system, to all seventeen of Nevada’s counties.

See comments relative to Section 4 on the treatment of socioeconomic conditions and impacts in the Draft EIS.

Page 3-139; Section 3.2.2.2.11 - Existing Traffic on Candidate Routes for Heavy-Haul Trucks

Current levels of service are of little value in assessing the impact of heavy-haul operations on traffic flow and safety. The projected baseline should include predicted levels of service during the time frame of heavy-haul operations. This prediction should be based upon reasonably expected future highway improvements and projected population growth.

The implication of noting that the existing levels of service exclude the planned Las Vegas Beltway is that the level of service is expected to improve when the beltway is completed. This very well might not be the case. Studies have demonstrated that in growing urban areas, growth takes place along transportation corridors, negating any improvement in traffic flow from route improvements. This was recently demonstrated for the Denver urban area where studies of an extensive improvement planned for the highways in that area predict insignificant change in traffic flow.

## **SECTION 4. ENVIRONMENTAL CONSEQUENCES OF REPOSITORY CONSTRUCTION, OPERATION AND MONITORING, AND CLOSURE**

Page 4-1; Section 4 - Environmental Consequences of Repository Construction, Operation and Monitoring, and Closure

The fact that DOE did not address the ecosystem level of organization for the Draft EIS renders an accurate interpretation of ecological impact assessment impossible.

Attachments G, F, H, I, J, K, and L discuss this issue, as do Westman (1985), Bartlett and Malone (1993), Salk and others (1998), Wiesner (1995), Caldwell (1998), Clark and Canter (1997), Ortolano (1997), and Gilpin (1997).

An equally important issue is that biological field studies conducted by DOE and used for the EIA process were improperly designed and statistically analyzed, thereby negating much of the information in the Draft EIS, Section 4. Study design and statistics are discussed in Attachments G and Q.

Performance confirmation is not an option. The use of the term “could” is incorrect, and the statement conflicts with the statement in Section 4.1.

Page 4-1; Section 4.1 - Short-Term Environmental Impacts of Performance Confirmation, Construction, Operation and Monitoring, and Closure of a Repository

The Draft EIS fails to adequately reflect the unique and highly controversial nature of the Yucca Mountain program and the impacts that are likely to derive from the Proposed Action. In the time line presented in Figure 4-1, there are a number of decision points that will generate considerable public and intergovernmental conflict. A decision to recommend Yucca Mountain for development as a repository in 2001, for example, will inject considerable conflict into the relationship between the State of Nevada and the federal government. This conflict will have implications that will be manifest in a number of ways, including possible considerable legal costs to the State and the federal government. As part of the analysis in Section 3, the Draft EIS should have examined impacts related to the conflict-inducing nature of the project.

As written, Section 3 treats the proposed Yucca Mountain repository as just another federal program, with no attention paid to the one-of-a-kind, controversial, extremely long duration, and extraordinarily complex program that is characterized by irreducible uncertainties in almost every aspect of its design and implementation. The overly general, off-the-shelf impact assessment contained in Section 3 is entirely inadequate and inappropriate for a program of the type and complexity presented by the Proposed Action. Nevada continues to believe, as stated in the State’s Scoping Comments on DOE’s 1995

Notice of Intent, that DOE should have prepared a programmatic EIS for the repository project and then tiered separate EISs to it for the Yucca Mountain repository facilities, the rail spur corridor selection, the selection of Nevada and national highway and rail routes, and the intermodal transfer facility. Such an approach would more accurately reflect the complex and interconnected nature of the various elements of the program and allow DOE to better assess and address environmental impacts program wide. It would also have enabled DOE to deal more directly and effectively with the wide range of uncertainty presented by each aspect of the program.

Page 4-1; Section 4.1 - Short-Term Environmental Impacts of Performance Confirmation, Construction, Operation and Monitoring, and Closure of a Repository

The statement under "Preconstruction Performance Confirmation Activities" gives the impression that site characterization will continue well past Site Recommendation, indicating that the suitability of the site will be determined before site characterization activities are complete, but after Site Recommendation, contrary to Section 114(a)(1) of the NWPA.

Page 4-3; Section 4.1 - Short-Term Environmental Impacts of Performance Confirmation, Construction, Operation and Monitoring, and Closure of a Repository

The text states that closure would include "Potentially backfilling the main drifts, access ramps, ventilation shafts, and connecting openings." This is not fully consistent with the description of closure in Section 2.1.2.3, Repository Closure. That section states closure would include, "filling of the main drifts, access ramps, and ventilation shafts; and sealing of openings, including ventilation shafts, access ramps, and boreholes." These two statements must be reconciled, and the commitment to backfilling and sealing must be maintained.

Page 4-4; Section 4.1 - Short-Term Environmental Impacts of Performance Confirmation, Construction, Operation and Monitoring, and Closure of a Repository

This Draft EIS is deficient because it lacks a design for the repository and adequate information regarding transportation routes. Until this information is available for the project, this Draft EIS should be rescinded and reissued only when the information is available for public review.

Page 4-5; Section 4.1.1.1 - Impacts to Land Use and Ownership during Performance Confirmation and from Land Withdrawal

Why is such a large area being considered for withdrawal? The repository area itself is much smaller than this, including all the surface facilities (870 acres). This appears to be an attempt by DOE to control a large area around the repository to act as a buffer zone for contamination from the repository. In this manner, no one would have access to this area for at least one hundred years or longer, thereby providing DOE with a much longer distance to the accessible environment.

It is unclear whether the Proposed Action would result in additional restricted access lands (i.e., more than what is now restricted for Yucca Mountain) from the withdrawal of BLM property. If access is restricted for additional lands, the Draft EIS should discuss impacts associated with reduced recreational opportunities.

Page 4-6; Section 4.1.1.2 - Impacts to Land Use and Ownership from Construction, Operation and Monitoring, and Closure

Public land is just that, land for the public. Just because the land is public doesn't mean there will be no potential conflicts on land use.

This section precludes backfill of the emplacement drifts. This is inconsistent with the design features and alternatives that are being held open to bound the impacts of the different thermal load alternatives and is inconsistent with the current design approach.

Page 4-6; Section 4.1.2 - Impacts to Air Quality

This section uses the boundary of the proposed land withdrawal area as the basis for calculation of impacts to the maximally exposed member of the public. As noted above, the proposed land withdrawal area is extraordinarily large compared to the repository operations area. This provides a large dilution factor for air quality analyses. The impact calculations in this section should be provided for the boundary of the operations area, rather than a distance of nearly 20 km from the operations area. This comment applies to all relevant analyses provided in Section 4. It also applies to Section 4.1.8.1, Radiological Accidents, where the maximally exposed offsite individual is placed 11 km west of the repository surface facility. In all cases, the maximally exposed offsite individual should have the characteristics of a subsistence farmer.

Page L-3; Figure L-1 - Yucca Mountain site topography, floodplains, and potential rail corridors

This map should include the entire proposed withdrawal area, indicating the 100 and 500 year flood zones as well as rail and road corridors. Since the withdrawal area would be considered part of the Yucca Mountain repository site, the entire site and any proposed construction or improvements must be considered in the floodplain assessment.

Page L-9; Section L.3.1.1 - Flooding

The nearest man-made structure within Fortymile Wash is the NTS road leading to Yucca Mountain. It should also be noted that, within the last decade, flooding has crossed and caused closure of U.S. Highway 95 at Fortymile Wash.

Page L-10; Section L.3.2 - Existing Environment Elsewhere in Nevada

Since floodplains have not been defined along any of the potential rail corridors, there is insufficient environmental information in this Draft EIS and floodplain assessment to assist in making a selection of transportation mode or rail transport route.

Page 4-10; Section 4.1.2.2.2 - Radiological Impacts to Air Quality from Construction

The Draft EIS should be consistent in its use of millirem and person-rem. The definition of person-rem should be given here, not later in the Section.

This section has inconsistencies in reporting dose. This section reports the dose for the maximum exposed individual offsite for a five-year period and the dose of a maximally exposed non-involved worker as an annual dose. This appears to have been done to keep the numbers for the worker low.

Page 4-11; Section 4.1.2.3.1 - Nonradiological Impacts to Air Quality from Continuing Construction, and Operation and Monitoring

What analysis supports the value of 10 micrograms per cubic meter used as the concentration for cristobalite?

Page 4-13; Section 4.1.2.3.2 - Radiological Impacts to Air Quality from Continuing Construction, and Operation and Monitoring

Define and quantify “very small” releases of other noble gases.

Were any analyses performed for accident scenarios for this section?

Page 4-15; Section 4.1.2.3.2 - Radiological Impacts to Air Quality from Continuing Construction, and Operation and Monitoring

Define and quantify “minimal” and “very small.”

Page 4-18; Section 4.1.3 - Impacts to Hydrology

The Draft EIS should give a map delineating the “region of influence.” Is this region the same as the proposed 150,000 acres withdrawal area?

Page 4-19; Section 4.1.3 - Impacts to Hydrology

Define and quantify “minor changes”, “minor impacts”, “extremely small”, and “very low.”

Page 4-20; Section 4.1.3.2 - Impacts to Surface Water from Construction, Operation and Monitoring, and Closure

What methods would be established to control water application amounts for surface and subsurface dust suppression? DOE’s track record for controlling and tracking water usage during site characterization is weak, at best.

Page 4-22; Section 4.1.3.2 - Impacts to Surface Water from Construction, Operation and Monitoring, and Closure

The Draft EIS should provide actual details of the plan for managing spills and radiological contaminant leaks, not just give a reference as an “example” of what might be done.

Page 4-23; Section 4.1.3.2 - Impacts to Surface Water from Construction, Operation and Monitoring, and Closure

The Draft EIS should provide the actual surface environmental monitoring plan.

Page 4-24; Section 4.1.3.2 - Impacts to Surface Water from Construction, Operation and Monitoring, and Closure

The statement “If DOE selected a rail corridor or heavy-haul route.....” should be changed to “When a rail corridor or heavy-haul route is selected....” Also, wouldn’t NEPA documents other than a floodplain/wetlands assessment be required?

Page 4-25; Section 4.1.3.3 - Impacts to Groundwater from Construction, Operation and Monitoring, and Closure

This section discusses the potential for contaminant migration to the groundwater and does not state whether any impacts to groundwater quality are predicted. It appears that DOE did not analyze potential water quality impacts of the repository project, especially consequences of long-term repository performance. The Draft EIS should indicate what analysis was used to determine impacts to water quality, if any, and show any impacts to water quality that might occur.

Page 4-29; Section 4.1.3.3 - Impacts to Groundwater from Construction, Operation and Monitoring, and Closure

What type of general groundwater flow patterns changes would be expected from pumping more than 0.72 million cubic meters from the western portion of Jackass Flats? Although the Draft EIS states that the changes would be “small,” the changes expected and any impacts from these changes should be discussed here.

Page 4-31; Table 4-11 - Land cover types in the analyzed land withdrawal area and the amount of each that repository construction and disposal of excavated rock would disturb (square kilometers)

It is interesting that the DOE did acknowledge potentially adverse consequences to the ecosystem from different thermal loading schemes in this table. However, the thermal loading issue with respect to biological resources is avoided in Table 4-12, page 4-35, which summarizes overall impacts from the repository, by stopping the summary after repository closure and ignoring the critical long-term ecosystem impacts. This is further discussed in Attachments G, F, O, and P.

Page 4-38; Section 4.1.5.2 - Impacts to Cultural Resources from Construction, Operation and Monitoring, and Closure

As stated previously, a new programmatic agreement should be negotiated that deals with issues of protection and treatment of historic properties during construction. Although DOE asserts that “the overall effect of the repository on the long-term preservation of the archaeological and historic sites in the analyzed land withdrawal area would be beneficial,” the SHPO notes that the land withdrawal for the repository effectively prevents access by Native American cultural practitioners, as well as archaeologists intent on research. At best, the overall effect might be considered neutral.



Page 4-38; Section 4.1.5.2 - Impacts to Cultural Resources from Construction, Operation and Monitoring, and Closure

Native American Viewpoints: The 1986 Environmental Assessment (EA) for Yucca Mountain stipulated that, "[i]f the Yucca Mountain site is approved for site characterization, [Native American impacts] will receive appropriately detailed treatment in research to be performed during the Environmental Impact Statement process."<sup>26</sup> The EA also made special note of the "potential for impacts on Native American cultures from [SNF and HLW] transportation activities" and stated that "[t]his aspect will receive appropriately detailed treatment ... if Yucca Mountain is approved for site characterization."<sup>27</sup> The Draft EIS, however, fails to specifically address potential impacts to Native American communities in Nevada (and in states through which SNF and HLW will be shipped to a Yucca Mountain repository). Such impacts include effects on Native culture, economics, infrastructures, emergency response/preparedness requirements, state-tribe relationship effects that may be caused by state routing or risk management decisions, implications for tribal sovereignty, Native land claim issues and impacts, and other areas potentially impacting Native peoples and communities. The Draft EIS should have contained a detailed description of the activities undertaken, the data collected, and the analyses done to adequately evaluate potential effects of the Yucca Mountain program on Native peoples and communities across the country. The Draft EIS should also have included an analysis of the impacts of the transportation of spent fuel and high-level waste.

The State's scoping comments on the 1995 Notice of Intent pointed out that assessment of potential Yucca Mountain impacts for Native American communities requires special attention to the unique laws, regulations, history, and culture of these peoples. In order to estimate potential impacts, the Draft EIS must provide an understanding of both the current and past relationship of Native American people to federal, state, and local governments and communities. Particular attention must be paid to specific Native American communities and connections and claims to the repository site. A similar assessment should be made for ancillary facilities, transportation routes, and other program-related activities. Topics to be addressed should include:

1. A historical description of Native American experiences in the areas affected by the repository program, including the issues of land claims, treaty obligations, federal laws relating to cultural and religious rights of Native Americans,

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<sup>26</sup> U.S. Department of Energy. Environmental Assessment Yucca Mountain Site, Nevada Research and Development Area, Nevada, May, 1986, pp C.4-30.

<sup>27</sup> Ibid, pp C.7-42.

unsettled political and legal issues, the potential applications of Indian law to repository issues, including transportation route selection and use, and the description of current and future socioeconomic conditions for Native Americans.

2. The economic structure of Native American communities and how these conditions might be affected by the Proposed Action.
3. A specific description of any direct and indirect employment, spending, and public service effects for Native Americans.
4. The location of Native American communities in relation to transportation routes, including the potential for accidents and emergency response to accidents.
5. The potential stigma impacts on Native American communities and businesses, including those economic activities now in development or likely to be developed in the future.
6. The role of the repository program in Native American political activities, including how the program might influence tribal or community behaviors.
7. The effect of the repository program on Native American relations with other governmental entities, including neighboring rural and urban communities, as well as county, state, and federal governments.
8. Assessment of the quality of life impacts of the program, including the conditions of psychological stress and its effects upon Native American community behaviors. The ways in which the repository program might influence or change Native American culture is especially important to a socioeconomic impact assessment.
9. Evaluation of the attitudes and opinions of Native American people toward the repository program, the DOE management of this and other activities important to them, and the effects upon their support or opposition.

The Draft EIS fails to adequately address any of these areas.

The State's research has shown that Native American tribes around Yucca Mountain and along transportation routes have unique governments. As independent federally recognized entities, tribal governments have a role equivalent to states in most federal undertakings. They also have a special status according to various environmental and cultural protection acts and in the Nuclear Waste Policy Act of 1982. To date, none of

the tribes in the study area has been granted "affected Indian Tribe" status under the NWPA, although several have applied.

The repository project has also spilled over into the campaign by the Western Shoshone National Council, a political entity made up of representatives from many Western Shoshone tribes, to reclaim lands under the Treaty of Ruby Valley of 1863. This has brought the Western Shoshone and other tribal governmental entities into conflict with DOE as well as with other federal and state agencies. Because of the unique governmental position of tribes, their interests are not likely to be well protected or even properly represented in deliberations over the repository. They may also come into conflict with neighboring local governments over differences in positions regarding the repository, thus increasing their isolation from intergovernmental interaction.

Most Native Americans in Nevada see the unwanted disturbance of cultural resources as the inevitable outcome of the Yucca Mountain project. They clearly would prefer that no disturbance take place at all and do not believe that impacts associated with the proposed repository would be mitigable.

The Native American tribes in the immediate vicinity of the Yucca Mountain project area and along potential transportation routes are, for the most part, economically disadvantaged. Reservations and communities in Nye, Lincoln, and Inyo counties are rural and isolated and either lack a land base or have land bases too small to support their populations by ranching or other locally common means. A large number of people are unemployed, underemployed, and/or living below the poverty level. Educational levels have improved in recent years, but without job opportunities in local communities, people must leave to take advantage of their training. Any negative statewide economic impacts associated with or caused by the repository or repository-related nuclear waste transportation will have a disproportionate impact on such communities because of these depressed baseline conditions. The Draft EIS fails to address such impacts.

DOE should also begin government-to-government consultations with federally recognized tribes in states other than Nevada where shipments of nuclear waste will cross tribal lands or travel within close proximity to tribal lands. The Draft EIS should discuss this consultation and should also include an assessment of the potential impacts to tribal lands and resources.

#### Page 4-39; Section 4.1.6 - Socioeconomic Impacts

The analyses of socioeconomic impacts contained in the Draft EIS are entirely inadequate and ignore major areas of potential negative effects associated with the Proposed Action. The impact assessment is limited only to the areas of employment, population, economic

measures (personal income, gross regional product, and government expenditures), housing, and public services. There is no attempt to evaluate the effects of the Proposed Action on the State's major economic sector - the tourism/gaming industry - or to examine impacts of the project on property values, economic development, State and local government revenues, State agencies, intergovernmental issues, and other important areas.

Perhaps the most important deficiency in the Draft EIS' treatment of socioeconomic impacts is the failure to analyze in any way the impacts of the Proposed Action on Nevada's most significant economic sector, the tourism/gaming sector. The Draft EIS contains no explanation for why such an analysis was not undertaken, and it ignores extensive comments and information on this matter provided by the State of Nevada and affected local governments in response to the 1995 Notice of Intent. The failure to address this crucial area of likely and significant impact is, of itself, grounds for finding the Draft EIS legally and substantively deficient.

The State of Nevada formally initiated a comprehensive study of the socioeconomic impacts of a proposed high-level nuclear waste repository at Yucca Mountain in 1986, after the Nevada site had been chosen as a potential waste disposal site. Between 1987 and 1995, this study has produced over 250 reports and work products, plus numerous publications in scientific and academic literature.<sup>28</sup> Summaries of research reports produced under the State's study are attached to these comments (see Appendix I).

State research has demonstrated that a major potential source of impacts from the Proposed Action stems from intense, negative perceptions and avoidance behaviors by the public in response to a high-level radioactive waste repository. This fact, combined with the vulnerability of the Nevada economy to changes in its public image, could produce large negative impacts. These are not "psychological" impacts. They are real, measurable economic effects that derive directly from the Proposed Action and are substantiated by a considerable body of scientific research and evidence.

The great public and media interest in the radioactive waste program makes it almost certain that any association with these negative perceptions will adversely affect Nevada's attempts to attract tourists, conventions, migrants, and new business investments. This would be especially damaging in the event of a nuclear waste accident associated with Las Vegas, one of the world's major tourist destinations and a dominant

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<sup>28</sup> A detailed summary of the State of Nevada research can be found in the publication, "State of Nevada Socioeconomic Studies of Yucca Mountain 1986 - 1992: An Annotated Guide and Research Summary," NWPO-SE-056-93 (June, 1993). See also "State of Nevada Socioeconomic Studies Biannual Report, 1993-1995," by James Flynn, et. al. (July, 1995).

contributor to Nevada's economy and tax revenues. The conclusion of the Nevada researchers and the State's Technical Review Committee is that stigma impacts could be very negative and very large.

Existing research on stigma effects and potential impacts provides a viable theoretical and methodological base that DOE should have used in the Draft EIS to undertake a detailed assessment of these types of impacts on Nevada's economy, public revenues, public services, and community quality of life. DOE's assessments should have taken into account the increasingly competitive gaming and tourist marketplaces and the important role that any negative perceptions and stigma could have in affecting an economy uniquely reliant on tourism revenues. It is very possible that, through the social amplification of risk process, even relatively minor events or accidents could have serious economic consequences. Such impacts would dwarf any projected benefits that might be derived from project employment and spending.

While Nevada's economic base may be especially vulnerable to stigma impacts, the Draft EIS should have addressed stigma effects for program facilities and transportation routes, wherever they might be located in the nationwide system.

The analyses of so-called "standard" socioeconomic impacts contained in the Draft EIS is inadequate and incomplete. The analysis in the Draft EIS ignores impacts to State and local government revenues, public services such as those related to emergency management and response, intergovernmental systems and relationships, and the unique tax and revenue redistribution systems that characterize Nevada's fiscal environment.

A comprehensive and integrated discussion of the need for an adequate assessment of economic impacts of the Proposed Action is contained in Appendix I of these comments.

A summary of State of Nevada research findings covering each major area of socioeconomic impact assessment is contained in Appendix II of these comments.

#### Page 4-39; Section 4.1.6.2.1 - Impacts to Employment

The Draft EIS fails to evaluate potential impacts to employment that could result from stigma-induced impacts on the Las Vegas and State economies. For example, research by the State of Nevada has shown that, should the repository project cause just one large hotel/casino not to locate in Nevada in the future, the immediate impacts to southern Nevada could be upwards of 14,200 jobs and almost \$500 million in revenue lost

annually to the local economy.<sup>29</sup> While the contribution of repository-related jobs to the local economy is insignificant (as demonstrated by the analysis in the Draft EIS), the potential negative effects of the Proposed Action on employment in the State could be significant and should have been addressed.

Page 4-43; Section 4.1.6.2.3 - Impacts to Economic Measures

The Draft EIS fails to analyze the potential impacts of the Proposed Action on the State's revenue base. While the repository's direct contribution to personal income, gross regional product, and governmental expenditures is insignificant, the potential stigmatizing effects of the project could have substantial impacts on revenues in the future. State research has shown that a one-percent drop in visitors in the year 2010 as a result of stigma-induced impacts from the Yucca Mountain project would cause a loss of about \$155 million in visitor spending in the Las Vegas area; a five percent decline would mean a loss of over \$775 million; and a ten-percent drop in visitation would result in over \$1.5 billion in losses. (For comparison, the recessions of 1980 and 1981 resulted in Las Vegas visitor declines of between 1% and 1.5%.) The same research indicates that, for each one percent decline in tourism, State revenues would be reduced by approximately \$7 million and employment in Clark County would drop by over 7,000 jobs.

The Draft EIS also fails to accurately analyze the impacts to the Nevada economy from population growth that is not directly related to the gaming sector. Under the State's tax and revenue system, any repository-related increases in population will cost the State and local governments more for providing public services than such increases would provide in revenues. This difference has been estimated at between \$670 to \$1,000 per person, per year.<sup>30</sup> This is a consequence of the "standard effects" of the project and is separate from any stigma-induced economic effects that may occur during the life of the program.

Different economic activities in Nevada have widely diverse revenue-cost implications for municipal, county, and state governments. Casino enterprises, for example, generally have positive impacts on government revenues versus costs. Due to the net mine proceeds tax, mining enterprises have positive impacts - if the mine is productive over the

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<sup>29</sup> "Tourism Economics and Nuclear Waste," by the Nevada Agency for Nuclear Project (July, 1995).

<sup>30</sup> The dependence of Nevada state and local jurisdictions on revenue contributions of visitors is unique and results from the fiscal structure of the state. Other economic developments, private or public, that do not expand the contributions of visitor spending will also have negative fiscal impacts. Public expenditures per person would have to be provided for repository-related population in excess of revenues these people would contribute through taxes, fees, etc. This means that, in the absence of payments made by DOE for mitigation or compensation or changes in the Nevada tax/revenue structure, the repository program will consistently produce significant negative fiscal impacts even without negative stigma-related effects.

long term. Federal government enterprises generate sales and use tax revenues, as well as payments in lieu of taxes, but generally these do not cover costs of project-related population growth.

Nevada collects significant revenues from non-residents via various gaming, sales, cigarette, liquor, and motor fuels taxes and redistributes these revenues to local governments. Thus, a repository effect that impacts one or more of these revenue bases (e.g., a stigma effect on visitor-gaming) could have wrenching effects at all government levels throughout the state.

Because Nevada's revenue structure is dominated by state-collected and/or state-distributed revenues, analysis and projection of revenues on an entity-by-entity basis, as is partially attempted in the Draft EIS, has inherent limitations in Nevada, and reliable projections at the entity level must include a statewide dimension. Models such as REMI (used as the principal economic assessment tool in the Draft EIS) have significant limitations in accurately modeling revenue aspects of local and regional economies in light of Nevada's unique fiscal circumstances.

#### Page 4-43; Section 4.1.6.2.4 - Impacts to Housing

Like population and employment, the Draft EIS treatment of housing ignores a major area of potential impact. State of Nevada researchers, DOE contract researchers, and independent researchers have documented the fact that nuclear waste facilities and nuclear waste transportation can have significant effects on property values under certain circumstances. For example, research conducted for DOE on the impacts to property values of transporting foreign research reactor spent nuclear fuel in South Carolina, published in June 1999, found that shipments of such materials in urban areas were directly responsible for lowering property values "in a substantive manner."<sup>31</sup> Other researchers have reported similar findings in relation to transuranic waste shipments through New Mexico. In 1991, courts in New Mexico awarded \$338,000 to a home owner whose property had been devalued by plans for a highway bypass for transuranic waste shipments.<sup>32</sup>

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<sup>31</sup> "Nuclear Waste Transportation and Residential Property Values: Estimating the Effects of Transient Perceived Risks," by Kishore Gawande and Hank Jenkins-Smith, University of New Mexico (June, 1999).

<sup>32</sup> *Komis v City of Sante Fe*, New Mexico (February, 1991). The case was originally heard in state District Court, and the award was upheld by the New Mexico Supreme Court. The case is especially relevant because the diminution in property values was demonstrated by survey research that indicated people would pay less for property that is known to be in proximity to a nuclear waste shipping route.

The Draft EIS should examine the potential for negative impacts to property values along proposed nuclear waste shipping routes in Nevada, especially those within urban areas. In addition, the Draft EIS should make some attempt to assess property value impacts on the Las Vegas and Nevada housing markets in general (i.e., what effects would any loss in property values along transportation routes have on the housing markets in general?).

Page 4-44; Section 4.1.6.2.5 - Impacts to Public Services

The analysis of impacts to public services in the Draft EIS is inadequate and incomplete. The Draft EIS fails entirely to examine the effects of the Proposed Action on State-level public services and State agencies. A June 1998 report prepared for the State of Nevada found that costs to State agencies alone for preparing for and responding to repository-related shipments of spent fuel and HLW in Nevada would be almost \$498 million for the first three years of the project.<sup>33</sup>

The Draft EIS also fails to adequately assess costs and impacts to local governments for preparing for nuclear waste shipments, training response and other emergency preparedness personnel, obtaining necessary equipment, and related activities. Inter-jurisdictional impacts resulting from the nature of the emergency response systems in Nevada, the existence of and need for inter-county mutual support agreements, multi-county training requirements, etc. would also occur. Such costs are direct impacts associated with the Proposed Action and should have been clearly identified and assessed in the Draft EIS.

Public service impacts should be calculated on a use/revenue basis for: (1) services provided to the Yucca Mountain project by state, local, and private utilities (subject to market and service regulation, e.g., electric, water, gas, etc.); (2) services provided to employees and their households; (3) services required by the indirect and multiplier effects of the project and project employees; and (4) services by state and local governments that are mandated by federal law or represent official responses by state and local officials and agencies to the activities of the Yucca Mountain project. The public services to be assessed should include:

- All state and local government services that contribute to the Yucca Mountain project. This would include services for health and safety, emergency management and response, transportation, regulation (e.g., permitting, licensing, and oversight), legal and judicial actions, and support for the public infrastructure.

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<sup>33</sup> "The Fiscal Effects of Proposed Transportation of Spent Nuclear Fuel on Nevada State Agencies," by Planning Information Corp. and Alvin Mushkatel, Arizona State University (June, 1998).



- State and local public services to the direct, indirect, and induced population and households resulting from the Yucca Mountain project, including the proportional and marginal costs for education, police and public safety, criminal justice, libraries, recreation and parks, local transportation, welfare, and publicly mandated services such as economic development. The cost estimates should include expenses for all community services, facilities, equipment, infrastructure, and staff.

The assumption in the Draft EIS that public services impacts related to the Proposed Action would be small in comparison to the overall employment and population of the region of influence does not mean that impacts cannot or will not be significant. Without a complete assessment, the significance of these impacts cannot be known.

Because the State's tax and revenue systems rely on tourism/gaming revenues to pay for growth in other sectors, public services impacts associated with additional repository-related population growth would generate negative fiscal impacts for state and local jurisdictions. Although such negative fiscal impacts would result from any non-gaming industry economic development, there is a distinction between the state's willingness to subsidize desired economic diversification and its willingness to subsidize the fiscal effects of a repository. As such, public services impacts and costs must be identified under the provisions of NEPA and the Nuclear Waste Policy Act.

#### Pages 4-44 through 4-60; Section 4.1.7 - Occupational and Public Health and Safety Impacts

Based on the Draft EIS, health impacts to workers and the public from initial construction through continuing construction, operation and monitoring, and eventual closure of the repository are expected to be relatively non-existent. A critical review of this apparent lack of danger to workers and the public reveals a disregard for analytical consistency on the part of the Department of Energy, the application of different measurement standards for workers and the public, and the use of a large number of unverifiable assumptions. The resulting analysis is confusing, at best, to both technicians and the public and provides virtually no basis for a scientifically valid decision making process. For example:

Section 4.1.7.5.1 indicates that only 1.5 to 2.0 worker fatalities related to industrial hazards will occur during the entire 110-120 years of construction, operation, and closure. This is inconsistent with other information in the Draft EIS.

Section 4.1.7.5.2 states that, based on a 50-year work life, impacts to workers in all phases of the repository activities will result in only 2.5-4.0 Latent Cancer Fatalities over 110-120 years. The highest collective dose is estimated to occur in relation to the

uncanistered, low thermal load scenario and is calculated at 10,700 person-rem over the 110-120 years of operation. (NOTE: Section 7.1.7, "Short-Term Impacts in the Yucca Mountain Vicinity" indicates a collective dose to workers of 77 person-rem, which is inconsistent with Table 4-33 referenced in this section.)

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Section 4.1.7.5.3 summarizes public health impacts in all phases of repository development as resulting in only 0.14-0.41 Latent Cancer Fatalities and indicates that "additional LCFs from short-term activities" will equal less than 0.4 or an increase of 0.01% over the existing average occurrence. Over the full range of construction and operation of the repository, the highest annual dose to the public is identified as 1.5 mrem "or less."

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Section 4.1.8.1 informs the reader that, in the event of a catastrophic earthquake, the worst case population exposure would cause only 0.0072 Latent Cancer Fatalities. A summary of exposure statistics for all potential environmental accidents shows that less than 0.02 additional LCFs would occur in the general population.

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Section 4.1.15.5.2 illustrates that there will be absolutely no deterioration of worker safety or resulting increase in accidents during the manufacture of disposal containers and shipping casks because there would be no unusual demands on existing facilities.

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Section 4.2.1.2.7 states that no health and safety impacts (other than industrial hazards) will occur during the construction sub-period related to retrieval. However, during the 11-year operations sub-period, while industrial hazards will remain about the same for all thermal load scenarios and the LCF for the Maximum Exposed Worker with a total exposure of 6950 millirem will be 0.015, the "calculated LCF" for all workers during retrieval is given as 0.19. During this same period, the Maximum Exposed Individual (MEI) in the public will receive 5.5 mrem, and the LCF is estimated to be  $2.8 \times 10^6$ . The "total population" collective dose is listed as 28 "person-rem," with LCFs equaling 0.014. "Exposure to the public for operations only" is noted as 0.1 Latent Cancer Fatalities. Surface and subsurface workers end up with a low 0.003 LCF probability and 0.19 LCFs during the retrieval period.

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Section 8.2.7 informs the reviewer that the cumulative impacts of the Nevada Test Site activities and historic dose scenario, combined with whatever impacts will or will not occur as a result of Yucca Mountain activities, will result in "less than 1 additional LCF." Whether this number was calculated in addition to already identified LCFs related to Yucca Mountain and indicates only the increase occurring from NTS is unclear.

Reciting dose numbers and LCF estimates only serve to reinforce the fact that, based on information provided by DOE, it is virtually impossible to determine whether there will,

or could be, any measurable worker or public health and safety impacts as a result of the proposed construction and operation of a Yucca Mountain repository. Based on these inadequacies, the State specifically requests a re-draft of the Occupational and Public Health and Safety analysis contained in the Draft EIS.

Existing sections on health and public safety are written in confusing jargon and conflicting technical terminology and do not provide opportunity for the public or decision makers to distinguish between routine radiological risk and radiological exposure risk related to the Proposed Action. The Draft EIS suffers from extensive shortcomings in analytical and statistical methods and serves to overstate DOE's ability to analyze potential radiation effects related to the Proposed Action.

From the 1950s until the present, Nevada communities and citizens have received radiation exposures from activities at the Nevada Test Site (NTS). Cumulative impacts resulting from radiologic exposures related to the proposed Yucca Mountain repository, detonation of over 900 nuclear tests, continued acceptance and storage of low-level nuclear waste in increasing volumes, and the potential for storage of mixed wastes at NTS all contribute to the need for protection of Nevada communities to ensure that the health and safety of their citizens are not adversely affected.

Nevada has no current capability to identify exposures or to monitor health impacts resulting from waste disposal activities at Yucca Mountain or the NTS. State health information data collection and analysis resources are inadequate to the task. Rural communities have virtually no such resources. The capacity to evaluate data in order to identify health effects from specific sources and types of exposures is either inadequate or non-existent. In addition, no work has been done, nor does local capacity exist, to address possible radiologic exposures to individuals who live or work within 6 to 40 meters (20 to 130 feet) of a nuclear waste highway route or a nuclear waste rail route, either in Nevada or along national waste transportation routes.

In December 1999, a State Agency-level working group was formed for the purpose of identifying needs and resources for improving radiological health information and assessment capabilities in Nevada. The State has reached an agreement with DOE that will provide funding for an upgrade of the State Cancer Registry. While this work is of great importance to Nevada, it will not provide a much-needed "snapshot in time" evaluation of current health in conjunction with monitored radiation levels.

What is needed in order to accurately and adequately address cumulative health impacts as outlined in the Yucca Mountain Draft EIS is a program to collect and monitor baseline data before and after any new radiologic waste-related programs are implemented and a study of the radiological exposures and health consequences of high-level waste

shipments proposed to be transported through Nevada communities and along national transportation routes.

Such a program should include:

- Regular, periodic reports on the health status of State and targeted/at risk communities through the design and use of a “snapshot in time” radiological data collection and monitoring program;
- An environmental monitoring program to address sources of radiation exposure from transportation, handling, storage, and disposal of high-level waste and spent nuclear fuel; and
- An outreach and education program designed to address public concerns regarding health issues related to high-level waste and spent nuclear fuel transport, storage, and disposal.

A health and environmental assessment and monitoring program should be developed in conjunction with the Nevada Division of Health, the State of Nevada, and other interested parties and be included in the final Yucca Mountain EIS.

Page 4-58; Table 4-32 - Estimated impacts to workers from industrial hazards for all phases

The statistics shown in this table are based on a DOE worker data base that is not consistent with national labor statistics. The national labor statistics data base should be used because repository construction and operation will best resemble an industrial work environment with an emphasis on daily work production and efficiency, rather than a DOE work environment where meeting production goals is not so closely linked to a profit motive. This approach would be consistent with the analysis approach used in Section 4.1.15, Impacts From Manufacturing Disposal Containers and Shipping Casks.

Page 4-60; Section 4.1.8.1 - Radiological Accidents

See comment on Section 4.1.2, Air Quality, above.

Page 4-65; Section 4.1.8.3 - Sabotage

The Draft EIS makes the dangerously faulty and unsupported assumption that “[t]he repository would not represent an attractive target to potential saboteurs due to its remote location and the low population density in the area.” In fact, the repository could be a very attractive terrorist target. It is an extraordinarily high-profile facility that will

generate a great deal of national and international media coverage should it ever become operational. A considerable amount of heated public controversy will be associated with the facility during site recommendation, licensing, and construction. Even a small incident could generate considerable media attention, and a serious terrorist/sabotage incident would gain wide-spread coverage. In addition, the very remoteness and isolation of the facility could actually help make the repository a more attractive and vulnerable target. For years, demonstrators infiltrated the Nevada Test Site during the period of underground testing, often eluding elaborate security measures and managing to reach the actual locations of tests before being apprehended. A successful attack need not require penetration of the facility itself. Repository surface operations could be especially vulnerable to attacks using man-portable anti-tank weapons that could be deployed from some distance away by terrorists infiltrating the perimeter of the site.

The Draft EIS examines a scenario involving low-level exposures in the waste-handling building which can contain radionuclides but not a more serious incident outside of a building, such as a breached cask/container in Caliente. (See Appendix A, section A 2.2/A 2.3) The assumption made in the Draft EIS that “rural targets” for terrorists are non-desirable has recently been proven wrong with the Amtrack derailment in Arizona. The proposed intermodal transfer station would make an attractive and potentially vulnerable target secluded in a canyon with clear overhead shots available.

Page 4-67; Section 4.1.11.1 - Impacts to Utilities, Energy, Materials, and Site Services from Performance Confirmation

This section should give more detail as to what existing sources and suppliers would be used; what wells would be pumped; and what regional suppliers of power would be used. Have there been any discussions with these existing sources and suppliers? Also, does this section cover performance confirmation activities throughout the operating life of the repository?

Page 4-71; Section 4.1.11.2 - Impacts to Utilities, Energy, Materials, and Site Services from Construction, Operation and Monitoring, and Closure

The “range of options” discussed under Repository Electric Power Supply Options should be more detailed. One cannot adequately determine impacts from a “range of options.”

This section should be updated in the Final EIS to reflect the new ownership relationship between Nevada Power and Sierra Pacific Power Company.

Since it is acknowledged that the existing electric power service does not have the capacity to serve a Yucca Mountain repository, the environmental impacts of the

alternatives available to upgrade the service should be evaluated in this Draft EIS rather than being deferred to a possible later NEPA analysis.

Page 4-72; Section 4.1.11.2 - Impacts to Utilities, Energy, Materials, and Site Services from Construction, Operation and Monitoring, and Closure

Construction Material: The Draft EIS fails to evaluate the impact on titanium resources from the planned use of titanium drip shields in 100 miles or more of emplacement tunnels. The current repository design calls for the use of such drip shields as an integral part of the waste isolation system. The Draft EIS, however, addresses only the use of concrete, steel, and copper as the primary construction materials. The impact of extraordinarily large amounts of titanium for waste package protection should be addressed.

The current repository design approach does not include concrete drift liners. The Final EIS must define the current proposed repository design, as noted above.

Page 4-75; Section 4.1.12.2 - Waste and Materials Impacts from Construction, Operation and Monitoring, and Closure

The Draft EIS states that low-level radioactive waste generated as a result of repository operations would be disposed of at the Nevada Test Site (Page 4-78). Since the Yucca Mountain repository would be a NRC-licensed facility for commercial spent fuel disposal, it may not be appropriate or possible for DOE to dispose of LLW at NTS facilities that are unregulated and intended solely for the disposal of defense LLW. The Draft EIS should assume that any LLW generated through repository operations would be disposed of off-site in commercial LLW disposal facilities licensed under NRC regulations. Impacts of such disposal (including the transportation of LLW from Yucca Mountain to the identified commercial LLW disposal facilities) should be identified and fully assessed.

Page 4-78; Section 4.1.12.2 - Waste and Materials Impacts from Construction, Operation and Monitoring, and Closure

The Draft EIS erroneously assumes that DOE has the authority to dispose of commercial low-level waste at the Nevada Test Site. This is not the case. Disposal of low-level waste at the NTS is strictly limited to low-level waste classified as defense low-level waste, i.e., waste generated as part of national defense activities such as production of special nuclear materials for use in atomic weapons. With few exceptions, low-level waste generated by repository operations would be classified as commercial low-level waste. By classification, the low-level waste generated by repository operations would be no

different from low-level waste generated by ongoing maintenance activities at commercial power reactors. Under the Atomic Energy Act, the low-level waste generated from ongoing maintenance at commercial power reactors is regulated by the Nuclear Regulatory Commission, not DOE. Moreover, the waste disposal facilities at the NTS would not and could not meet NRC licensing requirements for low-level waste disposal. Given these facts, the Draft EIS should include a discussion of how DOE would dispose of low-level waste generated from repository activities. This discussion should include an analysis of transportation risks associated with shipping the waste to one or more commercial disposal facilities outside Nevada.

Page 4-81; Section 4.1.13 - Environmental Justice

The Draft EIS concludes that, because DOE has assumed that no significant environmental or health and safety impacts exist within the Proposed Action, no "disproportionately high and adverse human health or environmental effects on minority and low income populations" will occur. Unfortunately, this approach does not include a thorough analysis of income scenarios along waste transportation routes, either in Nevada or along national routes identified in the Draft EIS. In addition, if DOE had utilized updated census figures for North Las Vegas, Nye County, Lincoln County, Esmeralda County, White Pine County, Inyo County, etc., along with current figures related to low-income and poverty level status in the U.S., a significantly larger percentage of Nevada and U.S. citizens might have come under the "low-income" or "poverty" umbrella for purposes of an Environmental Justice analysis.

First, one must assume there will be adverse impacts to worker and public health and safety as a result of the Proposed Action. At the very least, the Department of Energy should have made a more concerted effort "to collect, maintain and analyze information assessing and comparing environmental and human health risks...[and] use this information to determine whether their programs, policies and activities have adverse health or environmental effects on environmental justice populations." (Executive Order 12898, February 11, 1994) What is missing in the DOE health impacts analysis process is any apparent attempt to collect or maintain information over the long-term, or to conduct any kind of information system formation, other than computer modeling and projections. The "no environmental justice impacts" assumption was based on the original flawed assumption of no adverse health impacts.

Further, in the case of DOE's use of outdated economic and census data, the 1994 Executive Order on environmental justice clearly states that "federal agencies shall share information and eliminate duplication of effort through use of existing data systems and cooperative agreements among federal agencies and with state, local and tribal governments." (emphasis added) The State of Nevada, Clark County, Lincoln County

and Nye County all offered updated databases, the counsel of experienced socioeconomic analysts and technicians, and current income reporting data to the Department of Energy. DOE steadfastly and repeatedly refused to use the information and, in violation of Executive Order 12898, did not cooperate with state, local, and tribal governments in its determination of the presence or lack of an environmental justice impact within the Proposed Action.

In addition, EO 12898 pointedly states that any federal agency conducting an environmental justice analysis must "...ensure that public documents relating to human health or the environment, are concise, understandable, and readily accessible to the public." DOE's Yucca Mountain health impacts analysis is neither concise nor understandable and, therefore, does not provide an appropriate legal basis for determining the presence or absence of environmental justice impacts.

The current U.S. measure of poverty was instituted in the early 1960s and "no longer provides an accurate picture of the differences in the extent of economic poverty among population groups or geographic areas of the country, nor an accurate picture of trends over time." (*Measuring Poverty: A New Approach*. The Panel on Poverty and Family Assistance, 1998. National Academy Press, Washington, DC)

The Panel stated in its recommendations that "We believe a reasonable range for the initial threshold for the reference family of two adults and two children is \$13,700 to \$15,900 (in 1992 dollars)." DOE used \$12,674 for the same family size for the analysis in the Draft EIS. This same panel concluded that "the current measure does not accurately reflect differences in poverty across population groups and across time. We conclude that it would be inadvisable to retain the current measure for the future." Estimates of the official number and percent of people in poverty are published every year by the Census Bureau, with the most recent estimates available in *Poverty in the United States: 1998*. As of September 1999, the official poverty measure used in the 1998 report was under review by an interagency committee chaired by the Office of Management and the Budget. These figures have been, and continue to be, easily accessible.

Using measures based on the work of a National Academy of Sciences (NAS) panel, which published a report in 1995 that included a series of recommendations concerning improving the official poverty measure, experimental income (poverty) thresholds using 1997 as a base year are: (Table 1.0 - Source: Consumer Expenditure Survey, 1998.)\*



Year	Current Official Threshold	Change in Median FCSU	FCSU 1998-Backdated using new information
1990	\$13,254	\$13,342	\$13,028
1991	\$13,812	\$13,843	\$13,576
1992	\$14,228	\$14,253	\$13,985
1993	\$14,654	\$14,791	\$14,403
1994	\$15,029	\$15,166	\$14,772
1995	\$15,455	\$15,545	\$15,191
1996	\$15,911	\$15,744	\$15,639
1997	\$16,276	\$15,998	\$15,998
1998	\$16,530	\$16,401	\$16,248

\*The U.S. Census Bureau's "Poverty Thresholds 1998" used an even higher number for the reference family of two adults and two children. As of September 30, 1999, the 1998 figure used by the Bureau was \$16,530. In addition, the Census Bureau acknowledged that, in 1998, "the application of the NAS recommendations instead of the official measure implies that an additional 5.1 million people are living in poverty in the U.S."

According to the U.S. Census Bureau Population Survey of March 1999, the official measure of the number of poor and poverty populations in 1998, using experimental measures, was 34,476,000 people, or 12.7% of the U.S. population. Based on this information, it is obvious that low-income and poverty figures used by DOE in the Yucca Mountain Draft EIS do not accurately reflect differences in poverty across population groups and across time. A re-assessment of low-income and poverty levels in Nevada is necessary and added to this re-assessment should be figures related to communities along all transportation routes proposed in the Draft EIS.

In addition, DOE inaccurately uses the terms "low-income" and "poverty level" interchangeably. "Low income" is defined by the U.S. Department of Housing and Urban Development as 80 percent of the median family income for the area, subject to adjustments for areas with unusually high or low incomes or housing costs. "Very low-income" is defined as 50 percent of the median family income for the area, with the same adjustments. FY1999 income limits are easily accessible on the World Wide Web at [www.huduser.org\data\ factors.html](http://www.huduser.org/data/factors.html). Poverty level income in the U.S. is shown in Table 1.0 (above).

While DOE's use of 1990 outdated population and income-level statistics might be somewhat understandable, based on the time frame in which the Draft EIS was completed, it is not understandable or acceptable to disregard standard and accepted

statistical projection tools in estimating health and environmental justice impacts. Data used by DOE will be a minimum of two decades old, if and when the proposed repository begins operation in 2010. The point is not whether an environmental justice "case" can be proved, but rather that DOE's analysis is incomplete, insufficient, and inadequate for decision making purposes. The entire Environmental Justice approach should be re-calibrated, based on a newly designed environmental and public health and safety analysis and using 1999 income and population estimates as a base for more accurate extrapolations to the date of proposed repository start-up.

The concept of environmental justice promotes the fair treatment of people of all races, incomes, and cultures with respect to the development, implementation, and enforcement of environmental laws and policies. Fair treatment implies that no person or group of people shall shoulder a disproportionate share of the negative environmental impacts resulting from domestic and foreign policy programs. Nevada has been unfairly targeted to shoulder a disproportionate share of the negative impacts of America's nuclear legacy and the full burden of the U.S. nuclear power industry's inability to understand or deal with its own waste problems. This is an environmental justice issue, clear and simple.

Page 4-85; Section 4.1.14 - Impacts of Thermal Load and Packaging Scenarios

The maximally exposed individual for this analysis should be a subsistence farmer located at the boundary of the repository operations area. This would be equivalent to a maximally exposed individual adjacent to an operating nuclear reactor. There is no rationale provided to locate the maximally exposed individual 20 km from the operating repository surface facility.

Page 4-88; Section 4.1.15.3 - Components - Disposal Containers

The description of the disposal containers does not represent the current design approach. The Final EIS must define the disposal container design.

Page 4-98; Section 4.2.1 - Impacts from Retrieval Contingency

Because the NWSA requires DOE to maintain the ability to retrieve the waste for at least 50 years after the start of emplacement, DOE should have included this requirement in the Proposed Action. This is another example of the deficiency of the Draft EIS.

The Draft EIS should describe the manner in which the canisters would be removed in the event of a retrieval. These canisters will be hot and radioactive. Does DOE have the capability of retrieving the waste, if it becomes necessary?

The retrieval scenario used in the Draft EIS and the attendant assessment of impacts are inadequate. The retrieval scenario assumes that DOE would simply remove the waste from the repository and store it above ground at a site in Midway Valley. This scenario seriously understates the impacts and implications of having to remove spent fuel and HLW after it has been emplaced. The scenario fails to assess what happens to the waste after it has been removed and appears to assume that it can be left indefinitely in above ground storage. This is an inaccurate assumption.

In the event DOE discovers problems with Yucca Mountain that are so serious as to warrant the retrieval of the emplaced waste, it will almost certainly mean that the site is unsuitable for long-term disposal. In that event, it is entirely inappropriate to assume that it will be safe to store the same materials above ground in the same area for an indefinite period or in lieu of a repository. Rather, the retrieval scenario should have assessed the full range of implications, including the need to revisit a credible siting process for a disposal facility, the requirements for a shipping campaign to move the spent fuel and HLW to a more suitable site(s), and all the impacts associated with such a major, long-term undertaking.

Understanding the extraordinary problems that would be presented in having to remove waste from a repository, find a new disposal/storage site(s), and then transport the waste to the new site is important in order to assess the wide range of impacts associated with this aspect of the Proposed Action. The retrieval scenario and all its implications are important and integral aspects of the Yucca Mountain project and must be thoroughly understood and evaluated in the Draft EIS. This has not been done.

#### Page 4-99; Section 4.2.1.1 - Retrieval Activities

The figure on this page gives inadequate detail as to the exact location of the proposed waste retrieval and storage area, even when combined with Figure 3-12. The figure on this page should give more detail as to the exact location of the storage area.

#### Page 4-100; Section 4.2.1.2 - Impacts of Retrieval

See comments relative to Section 4.2.1 above. The Draft EIS fails to evaluate one of the most obvious areas of potential impact associated with retrieval, namely the costs of the effort and the related impacts to federal, state, and local governments. The costs associated with retrieval, especially if costs of finding alternative disposal and/or storage sites and transporting waste to them are factored in, will be considerable - certainly in the tens of billions of dollars. Such costs will impact the federal budget for years and could spill over as impacts on the State of Nevada and local governments in the event those

entities are required to perform regulatory, law enforcement, emergency management, transportation safety, and a variety of other activities as a result of the retrieval action.

This section of the Draft EIS also fails to evaluate the very significant impacts associated with a new disposal site identification process. Such impacts would be national in scope and would be amplified by the attendant media and political attention related to a failure of such proportions as to require removal of emplaced spent fuel and HLW from Yucca Mountain.

Page 4-102; Section 4.2.1.2.3 - Impacts to Hydrological Resources from Retrieval

Under the scenario described in the Draft EIS, the impacts to surface water and groundwater from retrieval will be confined to short-term effects such as runoff rate changes, drainage, infiltration rate changes due to the existence of the above ground storage facility, and demand for water. Because the Draft EIS, as written, does not postulate any alternative but to leave the waste at Midway Valley indefinitely, the document should assess the impacts associated with contamination of surface and subsurface water as storage canisters and systems fail over long periods of time. Such an analysis should assess the radiological risks and health effects to populations using water from aquifers contaminated over long periods of time.

Page 4-104; Section 4.2.1.2.5 - Impacts to Cultural Resources from Retrieval

These impacts should be addressed within the programmatic agreement. DOE must consult with tribes that consider these places to have cultural or religious significance.

Page 4-105; Section 4.2.1.2.6 - Impacts to Socioeconomics from Retrieval

The Draft EIS treatment of socioeconomic impacts of retrieval (limiting them to merely the effects of employment during the retrieval period) is entirely inadequate and grossly understates the real impacts associated with such a dramatic and far reaching event.

The Draft EIS should comprehensively examine the impacts of the retrieval scenario on the State of Nevada and on the State's principal economic sector. (See comments on Socioeconomics for Section 4.1.6 above and contained in Appendix I of these comments.) The decision to remove waste from a Yucca Mountain facility will undoubtedly be accompanied by considerable national and international media attention. The decision will have been made amidst major public and political controversy and concern regarding the safety of the facility. Such a situation will have considerable stigmatizing potential that could easily spill over to the State and the State's tourism industries. In many ways, the need to retrieve waste would be a worst case situation for

generating broad and potentially substantial economic impacts statewide, since it would mean that the repository's waste isolation systems had failed and that such failure was receiving major media attention.

Page 4-107; Section 4.2.1.2.7 - Table 4-56: Radiological health impacts from retrieval operations

The uncertainty in these calculated doses and risks should be provided. The operational procedures are conceptual, at best; therefore, the uncertainties associated with various operations scenarios should be provided as part of this evaluation.

Page 4-108; Section 4.2.1.2.8 - Impacts from Accidents During Retrieval

The analysis of the aircraft crash scenario should include explosives aboard the aircraft, since any aircraft that would crash in this vicinity would likely be an Air Force training jet with weapons that could include explosives. (See also comments on Appendix H.)

Page 4-110; Section 4.2.2 - Impacts from Receipt Prior to the Start of Emplacement

The entire contingency related to centralized interim storage of spent fuel and high-level radioactive waste and early waste shipments to a Nevada facility is dealt with in three short paragraphs in the Draft EIS. The Draft EIS attempts to rationalize this truncated evaluation by stating that "the impacts resulting from the construction and staging of a Waste Staging Facility would be similar to those from the implementation of a retrieval contingency described in Section 4.2.1." This is an erroneous assumption.

In fact, early receipt of waste at an above ground facility would generate impacts similar to the start of repository activities. Significant impacts can be expected across the country with the onset of spent fuel and HLW transportation operations. Early initiation of such shipments will likely result in increased impacts as state and local communities are forced to scramble to prepare for shipments and upgrade emergency response and related capabilities. In Nevada (as well as in cities and communities around the country), the onset of shipments and the initiation of waste receipt could trigger stigmatizing impacts and begin to negatively affect the State's principal economic sector. (See comments on Section 4.1.6 and Appendix I of these comments.)

If the Proposed Action includes a contingency for early waste acceptance at an above ground storage facility, such contingency must be analyzed and impacts assessed to the same level and degree as for the repository itself. This includes evaluating risks and impacts associated with construction, facility operations, and transportation (including how waste will get to such a facility given the early onset of operations, the feasibility of

constructing a rail spur and the accelerated schedule, the impacts of intermodal and heavy-haul transport, and the impacts of legal-weight truck transport).

The assumptions in this analysis must be described. The Draft EIS seems to assume all waste arriving would be contained in uniform dimension canisters. If waste handling different from that anticipated for the conceptual retrieval operations is required, the impacts of this action must be evaluated.

## **SECTION 5. ENVIRONMENTAL CONSEQUENCES OF LONG-TERM REPOSITORY PERFORMANCE**

### **Page 5-2; Section 5 - Environmental Consequences of Long-Term Repository Performance**

As noted above, it is incorrect to assert that the evaluation of the No-Action Alternative can be used to inform the Secretary of Energy's decision on whether to recommend the Yucca Mountain site to the President for development of a repository. The No-Action Alternative scenarios are not reasonable scenarios, and the Draft EIS acknowledges this situation in Section 1.4.3.4. Therefore, the NEPA analysis is insufficient, and the Secretary's use of the analysis in making any decision would be improper.

### **Page 5-3; Section 5.1 - Inventory for Performance Assessment Calculations**

By not including more radionuclides in the impact calculations, the risk is artificially minimized. The emphasis should be on "accurate" impact calculations, not "efficient" calculations.

Does the waste inventory contain any "classified" radionuclides? If so, the Draft EIS should indicate this and discuss the impacts of these radionuclides on the dose to humans and the environment.

The discussion on radionuclides with short half-lives should give the range of numbers of years, not just the statement of "generally less than several hundred years."

There should be an evaluation of the uncertainty that waste package inventory averaging introduces to performance. Because the model relies on different infiltration rates over different parts of the repository, the distribution of packages of "real" waste with different composition ratios could result in some "real" waste being released and transported in quantities and compositions not accounted for by averaging.

Page 5-5; Section 5.1 - Inventory for Performance Assessment Calculations

What is the analytical basis for the inventory of neptunium-237 being increased by 58% to account for the decay of americium-241?

Page 5-6; Section 5.1 - Inventory for Performance Assessment Calculations

Plutonium should be included in both the radionuclide inventory assessment and the chemical toxicity assessment. Recent evidence indicates that plutonium moves more quickly than originally thought.

Page 5-8; Section 5.2.2 - Components of the Waste Package

The current design of the waste package has the Alloy-22 on the outside of the stainless steel, and the thicknesses of both materials has changed. The Draft EIS should use the correct information.

Page 5-10; Section 5.2.3.1 - Limited Water Contacting Waste Package

The discussion regarding water movement in the unsaturated zone appears to state that DOE cannot adequately model the flow regime over time. Since the model looked only at movement after the heat effects, the reader cannot determine the effects of the heat on the UZ system and the concurrent changes to the flow regime.

The discussion on uncertainty fosters the belief that this Draft EIS contains insufficient data to adequately evaluate the site for suitability.

The output of the TSPA model is highly dependent on seepage rate into the drifts; however, the results of critical studies on the movement and chemistry of water after the thermal pulse are not yet available, according to the text in this section. It should be stated clearly that repository performance projections provided in this Draft EIS are tentative, at best, and are subject to large adjustments pending further information on crucial aspects of heat effects on the assumed characteristics of the natural barrier system and its interaction with the engineered barrier system (which currently is not the same as that described in this Draft EIS). This uncertainty alone is sufficient to declare the projected performance of the repository in this Draft EIS premature and lacking in credibility.

Page 5-11; Section 5.2.3.1 - Limited Water Contacting Waste Package

The last sentence of this section should state that the rate of water movement through the unsaturated zone can be from 50 years to thousands of year, not less than 100 years to thousands of years, as stated in this section.

Page 5-11; Section 5.2.3.2 - Long Waste Package Lifetime

It should be made clear that the waste package degradation models are essentially unsupported by reliable long-term data and are based largely on extrapolation and assumptions of expected behavior. In addition, the waste package design analyzed in this Draft EIS is not the design currently under consideration. Therefore, the TSPA products in this Draft EIS are invalid.

Page 5-12; Section 5.2.3.3 - Slow Release of Radionuclides From Waste Package

The waste form degradation model is based, in part, on speculation regarding the mechanisms of water contacting the waste form and the unresolved matter of the solubility of Neptunium-237, which is critical to dose calculations. This model is not valid under these circumstances.

Page 5-15; Section 5.2.3.4 - Reduction in Concentration of Radionuclides and Chemically Toxic Materials During Transport

Performance associated with alternative saturated zone flow models should be calculated. The six-stream-tube model is arbitrary and not based on any data. Furthermore, the assertion that alternative models would not result in significant differences in calculated doses is based entirely on the speculative long life of the waste packages that supposedly would result in delay of nearly all releases beyond 10,000 years. It is incorrect for the Draft EIS to assert that it is unimportant to have a clear understanding of saturated zone flow because the waste package will delay releases beyond the period of regulatory concern. Characterizing the saturated zone flow is a key function of site characterization that must be completed prior to site recommendation and cannot be ignored simply on the assertion that the waste package lifetime makes it unnecessary. By so doing, an important element of the multi-barrier concept has been evaded.

Page 5-16; Section 5.2.3.6 - Nuclear Criticality

The Draft EIS should provide more information as to what “minor effects” a nuclear criticality incident would have on repository performance and what analysis was performed to support this conclusion.



Page 5-17; Section 5.2.4.1 - Uncertainty Associated With Societal Changes, Climate, and Other Long-Term Phenomena

The statement regarding benefits from future human activities such as technology for radiation removal from water and the environment and cures for cancer is not relevant in this Draft EIS. These concepts cannot be offered or committed to as mitigation measures and surely cannot be justified as an excuse for releasing radionuclides to the environment. This statement should be removed.

The time and magnitude of the projected peak dose is sensitive to the idealized climate cycle pulses. The uncertainty associated with the superpluvial pulses should be illustrated.

This section fails to include the potential for global climate change to affect repository performance and environmental consequences. The oversight also exists in Section 5.9, page 5-46, Consequences to Biological Resources and Soils. The section does address the thermal loading effect (Table 5-18, page 5-47) to biological resources and soil. However, the potential temperature increases are overly conservative and their estimated ranges from low to high are ignored. Clearly, there is a potential for vegetation to disappear above the repository and for the soil cover to be eroded away. The consequences of this to the site's geohydrology and repository performance should be addressed in Section 5.4.1, 5.4.2, and 5.4.3. These weaknesses exist because DOE failed to adopt an ecosystem approach for the Draft EIS, as recommended in Attachments F, G, K, and L and by Bartlett and Malone (1993), Clark and Canter (1977), and Salk and others (1998).

Page 5-18; Section 5.2.4.2 - Uncertainty Associated with Currently Unavailable Data

The list of priority factors requiring additional data and analysis should include Saturated Zone Flow and Transport. (See comment on Section 5.2.3.4, Page 5-15).

It would seem appropriate, due to the importance of this project, that DOE would want to complete the analyses of the eight study areas listed below in order to provide more valid data upon which to base decisions safeguarding the population of this state. Trying to assess the impact on the State without complete information is akin to second-guessing future security.

1. Drift seepage and percolation to depth
2. Effects of heat and excavation on flow
3. Dripping onto waste packages

4. Chemistry of water dripping on waste packages
5. Integrity of the corrosion-resistance waste package barrier
6. Integrity of the spent nuclear fuel cladding
7. Formation and transport of radionuclide-bearing colloids
8. Transport in the unsaturated zone

The Draft EIS contains other areas that lack data for proper decision making: transportation mode feasibility; transportation operation studies; long-term site quarantine; further groundwater mapping; transmutation; and the simple effect of heating the rock. The Final EIS should not be issued until these further studies are complete and the results incorporated into the EIS analysis.

#### Page 5-20; Section 5.2.4.3.2 - Weighting of Alternative Conceptual Models

The reference designs of the repository and waste package in the Draft EIS are not the designs currently under consideration. This alone undermines DOE's ability to use the TSPA results in this Draft EIS for selection of the preferred alternative.

There has been considerable debate over the actual flow paths that would be followed by the radionuclides released from the repository. Modeling results performed by the State of Nevada (Lehman and Brown, 1994, Lehman and Brown, 1995) indicate major differences may exist in flow path direction, velocity, and sorptive capability compared to that used in the latest assessments by DOE, including the Draft EIS, if all data sets are utilized.

By failing to evaluate credible alternative models or opposing views of the saturated zone, DOE is not in compliance with NEPA. Being out of compliance with NEPA means automatic noncompliance with the NHPA. DOE is specifically out of compliance with NEPA 1502 for not summarizing, discussing, or using important data sets. DOE has failed to evaluate credible opposing viewpoints and does not propose testing to reduce uncertainty in the choice between alternative conceptual flowpaths. (See Attachment U for a more detailed discussion of this issue.)

#### Page 5-21; Section 5.2.4.3.3 - Uncertainty and the Proposed Action

The Draft EIS should compare the "lumped" performance analyses to the discrete analyses with each type of uncertainty isolated. This would provide information on the

relative importance of each type of uncertainty so a value assessment can be made of various types of uncertainty reductions. For example, it would be important to know the relative importance of conceptual model uncertainty in the saturated zone flow model, as discussed above.

Page 5-22; Section 5.2.4.3.5 - Confidence in the Long-Term Performance Estimates

This section of the Draft EIS concludes with the statement, “The EIS performance assessment represents a ‘snapshot in time’ and ongoing work will refine that snapshot.” In fact, the performance assessment is not analogous to a “snapshot” at all. A snapshot implies a reasonable representation of reality. The Yucca Mountain performance assessment represents a compilation of incomplete data, buttressed by assumptions and guesswork, and analyzed using models of questionable validity in order to lend an illusion of accuracy to its conclusions.

Page 5-22; Table 5-3 - Confidence in the long-term performance of the repository system in relation to groundwater contamination

Table 5-3 does nothing but show that DOE has insufficient information about Yucca Mountain to make a suitability determination.

The statement of high confidence in the solubility of Neptunium-237 in this table is inconsistent with information on Page 5-13. Overall, this table suggests only low to medium confidence in the most important factors in the TSPA. Based on this, it is premature to use the performance assessment in the Draft EIS to support any decision regarding the preferred alternative. A new performance assessment based on higher confidence in the critical models should be issued for review and comment, as part of a re-issued Draft EIS

Page 5-26; Section 5.4 - Waterborne Radiological Consequences: Box: Maximally Exposed Individual

The Maximally Exposed Individual (MEI) should be an age/gender weighted subsistence farmer. The added level of conservatism is justified in light of large uncertainties associated with dose projections in this Draft EIS and the small increase in dose that would be experienced by this MEI, compared to the maximally exposed individual proposed in this Draft EIS. The full pathway dose rates should be calculated for the subsistence farmer described above, rather than from the Amargosa Valley survey data referenced on Page 5-31.

The definition of the Maximally Exposed Individual in the Draft EIS is not the same as the Reasonably Maximally Exposed Individual used by EPA in their proposed standard for Yucca Mountain. There should be consistency between these two documents.

Page 5-27; Section 5.4.1 - Consequences from the Groundwater Exposure Pathway for the High Thermal Load Scenario

The assumption that radionuclides would mix in the unsaturated zone has no basis. DOE's own statement, on page 5-10, implies that DOE cannot adequately model the unsaturated zone.

Diluting the concentration of the yearly infiltration from Yucca Mountain into the 17.3 million cubic meters of water use in Amargosa Valley is not conservative. Data from Nye County drilling indicates that the flow is compartmentalized, and there would not be a large amount of dilution of the radionuclides. This statement applies also to the similar dilution used in the Intermediate and Low Thermal Load scenarios.

Page 5-28; Section 5.4.1 - Consequences from the Groundwater Exposure Pathway for the High Thermal Load Scenario

The discussion of the waste package lifetime should be rewritten to indicate the new configuration of the waste package, i.e., the Alloy-22 on the outside.

Page 5-30; Section 5.4.1 - Consequences from the Groundwater Exposure Pathway for the High Thermal Load Scenario

The discussion about the construct of the mean implies that DOE really doesn't know when the peak dose will occur and, in all probability, can't know when it will occur.

Page 5-30; Table 5-7 - Peak Radionuclide Concentrations

The Draft EIS should provide Maximum Contaminant Levels (MCLs) as set by EPA for drinking water systems to compare with the peak radionuclide concentrations given in this table.

Page 5-34; Section 5.4.3 - Consequences from the Groundwater Exposure Pathway for the Low Thermal Load Scenario

This section states there will be no change in the infiltration rate for the low thermal load scenario because areas used for the low thermal load scenario would have different rates of infiltration as opposed to the high thermal load scenario. This statement makes no

sense. The Draft EIS should show the analysis used to support this statement and give the infiltration rate for Area 5.

Page 5-34; Section 5.4.3 - Table 5-13: Population consequences from groundwater releases of radionuclides during 10,000 years after repository closure for the low thermal load scenario

This table shows the scaling factor for changing the dose rate for the maximally exposed individual into a dose rate for a member of the population was computed by diluting 46 acre-feet of water infiltrating through the repository by the annual water use in the Amargosa Valley of about 14,000 acre-feet. If exposures are to be calculated at Lathrop Wells, or anywhere along Highway 95 or north of Highway 95, then these dilution volumes are probably too high and inaccurate, especially given a compartmentalized system.

Page 5-37; Section 5.4.4 - Sensitivity Study on the Fuel Cladding Model

Based on the information provided, there is no technical basis to assume any specific quantitative performance credit for cladding, other than zero. Until such time as reliable information indicates cladding will provide more than “some impediment to radionuclide mobilization if the waste package was breached,” no performance credit should be taken for the cladding. This is justifiably conservative, given the high uncertainty in waste package failure coupled with the high uncertainty of cladding degradation over time.

Page 5-38; Section 5.5 - Atmospheric Radiological Consequences

What analysis supports the expectation that Iodine-129 will dissolve in the groundwater rather than migrating as a gas?

Page 5-38; Section 5.5.1 - Carbon-14 Source Term

This analysis is highly sensitive to the large uncertainties in waste package and cladding degradation models. The uncertainty in the source term associated with these two factors should be discussed in this section.

Page 5-39; Section 5.6 - Consequences from Chemically Toxic Materials

Would there be any changes to the discussion in this section based on the change in the waste package design? If so, the Draft EIS should indicate these changes.

Page 5-39; Section 5.6.1 - Human Health Impacts From Chromium, and Table 5-17

At the 5 and 20 km locations, the expected chromium concentrations are relatively close to the Maximum Contaminant Level Goal (MCL) and highly subject to uncertainty in waste package failure expectations (and at 20 km, the saturated zone flow model). A slight (but not unreasonable) change in the assumption regarding juvenile waste package failures would result in the MCL Goal being exceeded. The conclusion that, for the high and intermediate thermal load alternatives, “DOE anticipates no detrimental impacts to water quality due to chromium contamination” (Page 5-40) is not justified when reasonable uncertainties are taken into account. The analysis is also somewhat sensitive to the waste package design, which, in the Draft EIS, is not the same as that being currently considered. The current design is likely to permit more rapid mobilization of chromium.

Page 5-40; Section 5.6.2 - Human Health Impacts From Molybdenum

The above comments regarding chromium also apply to molybdenum in terms of the amount of metal that could be mobilized if uncertainty due to a single assumption regarding juvenile waste package failure and the current waste package design are taken into account. The lack of a drinking water standard is not a justification for releases of molybdenum into groundwater in amounts similar to chromium, especially when adverse effects of molybdenum in water used by livestock have been documented for years.

Page 5-42; Section 5.7 - Consequences From Disruptive Events

Because of the wide range of uncertainty associated with the base case dose calculations and the questionable representativeness of the mean of the model realizations, the base case performance should be represented by the 95<sup>th</sup> percentile of the calculations rather than the mean.

Page 5-42; Section 5.7.1 - Drilling Intrusions

This drilling intrusion scenario is unrealistic. Unless there are adequate institutional controls at the site, drilling could occur not long after closure of the repository. Technology could make using a drill bit obsolete. There is no basis given in the Draft EIS for the size of the drill bit or the use of drilling mud, especially when projecting an intrusion more than 10,000 years out. In addition, there is no basis for using just one event. Multiple drill holes are more likely to occur.

The information on doses from the minimal-impact intrusion scenarios does not support the conclusion that the effect would be “small” (Page 5-49). With the larger waste

release amount analyzed, it appears that peak doses at the 95<sup>th</sup> percentile could exceed the existing safe drinking water standard of 4 mrem/year. Scenarios chosen for the analysis are not conservative because they rely on the uncertain condition of waste packages at 10,000 years in the assumption about resistance to intrusion. Also, the larger release analyzed represents less than one third of the contents of one breached container. Overall, it appears that the repository system is not resilient to a realistic human intrusion scenario, contrary to the conclusion of this Draft EIS.

Page 5-44; Section 5.7.2 - Volcanic Disturbance

The uncertainty related to the conclusions in this section should be described in the Draft EIS. The description should include assumptions used about the integrity of the waste packages affected in the scenarios. The statement that the peak dose would occur thousands of years after the event based on the time needed for groundwater transport of the radionuclides is vague and not a correct assumption if the uncertainty in the flow and transport models is taken into account.

Page 5-45; Section 5.7.3 - Seismic Disturbances

Uncertainty in the rock fall analysis should be discussed in the Draft EIS. This analysis relies heavily on the waste package degradation model. Given the uncertainty associated with the models, the range of potential consequences should be illustrated.

Does the change in the waste package configuration change the analysis used in this section?

Page 5-48; Section 5.9 - Consequences to Biological Resources and Soils

The discussion of estimated doses from irrigation water and discharge at Franklin Lake Playa should indicate that the time period considered is 10,000 years. As seen in the referenced Draft EIS sections, peak doses, even at 20 km, could be as high as 1.4 rem/year. None of the peak doses calculated can be considered small and would certainly exceed any standard established for a repository.

## **SECTION 6. ENVIRONMENTAL IMPACTS OF TRANSPORTATION**

As discussed in the comments that follow, DOE has not demonstrated the technical, economic, or environmentally acceptable feasibility of transporting spent nuclear fuel and high-level radioactive waste to the proposed site. Absent this demonstration, DOE violates the National Environmental Policy Act by deferring transportation related decisions. Specifically, if the proposed repository is approved based upon this EIS, DOE

will begin to make a substantial commitment of resources to the proposed repository, even though the method of transportation to the site has not been determined. This could force a transportation related decision that results in unacceptable, adverse impacts. This is the scenario that the NEPA process is designed to avoid.

Section 6 of the Draft EIS purports to address the environmental impacts of transportation without ever specifically describing the radiological characteristics of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) that cause the most serious adverse impacts of repository transportation on public health and safety and the environment.

Nevada believes that the impacts of repository transportation activities cannot be accurately assessed without explicitly acknowledging the deadly nature of SNF and HLW. Nevada's 1995 scoping comments recommended: "The radiological consequences of exposure and contamination associated with each reference fuel type should be presented in terms understandable to the general public, and these consequences should be presented in the Executive Summary as well as in the body of the draft EIS." DOE has chosen to ignore Nevada's recommendation.

Section 6 contains no meaningful discussion of the radiological characteristics of the reference fuel types to be transported to the repository. Indeed, the Draft EIS overall barely discusses the radiological hazards of SNF. The Executive summary states that spent nuclear fuel "consists mostly of uranium, and is usually intensely radioactive because it also contains a high level of radioactive nuclear fission products." (p. S-4) The overview section of Volume 1 states that spent nuclear fuel "is intensely radioactive in comparison to non-irradiated fuel." (p.1-6) Except for identifying Cesium-137 as a major source of SNF preclosure impacts and shielding requirements (p. A-9), Appendices A, F, and J provide little specific information on the hazards of SNF.

DOE has designated a 26 year-old PWR spent fuel assembly with 39,560 MWR/MTHM burn-up and 3.69 percent U-235 initial enrichment as the "typical fuel type" for transportation impact analysis in Section 6 of the Draft EIS. (p. A-14) All other factors being equal, cooling time is the single most important determinant of transportation radiological risk. The 26 year-old SNF assumed in the Draft EIS is considerably less dangerous than the 10 year-old SNF assumed in past DOE program documents, and much less dangerous than the 5 year-old SNF that could be shipped to the repository in casks currently licensed by the NRC.

The typical PWR assembly described in the Draft EIS contains 31,000 curies of Cesium-137 and 21,000 curies of Strontium-90, and is a powerful source of penetrating gamma and neutron radiation. A person standing next to a single, unshielded 26 year-old SNF assembly for a few minutes would receive a radiation exposure sufficient to cause death



in 50 percent of the population. Extend the time to ten minutes, and death from classic radiation sickness replaces concern about latent cancer fatalities.

In the Draft EIS Summary document (p. S-21), DOE states that legal-weight vehicles would not require special state-issued permits to transport HLW or SNF. This statement is not correct. These vehicles would still need valid hazardous materials transport permits to enter and traverse Nevada with such loads.

Also in the Summary document (p. S-53) and later in Section 6, DOE fails to address the potential shipping alternative of repackaging spent fuel and HLW at a potential intermodal transfer site. Under the DOE heavy-haul scenario, HLW and SNF coming to an intermodal facility by rail must be shipped to the repository via heavy-haul trucks and cannot be repackaged or reconfigured for legal-weight truck transport. It is possible that, given the length, geography, and impacts associated with heavy-haul transportation on the scale required to implement the Proposed Action, such shipments may prove to be impossible. In such an event, intermodal alternatives to heavy-haul should be evaluated.

On the bottom of page 6-1, the Draft EIS states: “Because the mode of transportation used to ship from each site would depend on several factors that DOE does not control (for example, future capabilities of shipping sites, rail service to shipping sites, and labor agreements), DOE recognizes that it cannot predict the specific transportation mode (truck or rail) of each shipment to the repository.” This statement is factually incorrect. The NWPA, as amended, makes DOE the shipper of record for all SNF and HLW shipments to the repository. As shipper of record, DOE is legally entitled to dictate the choice of mode for every shipment. Over the past decade, DOE contractor studies, such as the Near Site Transportation Infrastructure and Facility Interface Capability Assessment, have documented the technical factors which constrain modal choices at each commercial reactor site and estimated the cost of adding rail shipment capability at truck-only sites. DOE’s decision to make all transuranic waste shipments to the Waste Isolation Pilot Plant (WIPP) by truck, even though rail transportation to WIPP is feasible from major federal facilities such as Hanford and Savannah River, is a strong precedent for DOE control of repository transportation modal choice decisions. Moreover, DOE recently dictated not only the choice of mode (rail), but also the service option (dedicated trains), the port of entry (Concord), and the preferred route (Feather River Canyon) for the recent foreign research reactor SNF shipments to INEEL.

#### Page 6-2; Section 6 - Environmental Impacts of Transportation

Although DOE maintains that the mostly legal-weight truck and mostly rail scenarios adequately bound the analysis for the national transportation scenarios, this is not true for the Nevada Transportation Scenarios. Under the mostly legal weight-truck scenario,

DOE must still deal with more than 300 rail shipments of high-level waste and Naval fuel (references ). The Nevada Transportation Scenario fails to describe how DOE will deal with these shipments without either constructing a rail line or operating an intermodal transfer site and heavy-haul truck transport.

The Draft EIS fails to identify a preferred rail corridor and sets forth no timetable for selection of a preferred rail corridor, despite DOE's assertion that the information presented is sufficient to select a preferred corridor. The Draft EIS states: "Although it is uncertain at this time when DOE would make any transportation-related decisions, DOE believes that the EIS provides the information necessary to make decisions regarding the basic approaches (for example, mostly rail or mostly truck shipments), as well as the choice among alternative transportation corridors." (p. 6-1) Referring specifically to the selection of "implementing alternatives," such as "alternative rail corridors in Nevada," the Draft EIS states: "If and when it is appropriate to make such decisions, DOE believes that the EIS provides the information necessary to make these decisions." (p. 6-2) According to the Draft EIS, additional information, analyses, and consultations would be required "for selection of a specific rail alignment within a corridor." (p. 6-1)

DOE's failure to designate a preferred rail access corridor in the Draft EIS violates the National Environmental Policy Act (NEPA). NEPA procedures are designed to "insure that environmental information [including information on the human environment as well as public health and safety] is available to public officials and citizens before decisions are made and before actions are taken." DOE's approach for the Draft EIS denies the affected public a meaningful opportunity to participate in the rail corridor evaluation process before DOE prepares the Final EIS.

Moreover, DOE's refusal to narrow the choice of corridors extends the region of influence of the Proposed Action to thirteen Nevada counties traversed by the five rail corridors and their existing mainline rail connections. Virtually the entire population of Nevada will be held hostage by DOE's indecision. Coupled with the absence of a timetable, the resulting uncertainty, in and of itself, will cause adverse socioeconomic impacts for individuals, businesses, and communities.

During the scoping process in December, 1995, the State of Nevada recommended the following process to DOE: "The Draft EIS must present a technically credible methodology for comparative evaluation of rail spur route options. The State of Nevada believes that DOE should fully evaluate at least three feasible rail spur routes before selecting a preferred route." Nevada also recommended specific criteria for the Draft EIS comparative route evaluation: 1) impacts on public health and safety; 2) impacts on highly populated areas; 3) engineering feasibility; 4) impacts on surface and groundwater

resources, threatened and endangered species, and federal and state parks and refuges; 5) cost of construction, recognizing that predictability of costs may be as important as least cost in ranking alternatives; 6) avoidance of private lands and potential for voluntary acquisition of private lands where necessary; 7) impacts on Native American lands and cultural resources; 8) potential conflicts with U.S. Air Force facilities and operations; and 9) economic development costs and opportunities, addressing both standard and special (risk-induced) socioeconomic impacts.

The Draft EIS does not reveal the process DOE plans to use in selecting a preferred rail corridor. The baseline information provided in Section 3 and the impact analysis provided in Section 6 and Appendix J are particularly deficient regarding impacts on highly populated areas; engineering feasibility; construction costs and cost uncertainties; potential for voluntary acquisition of private lands; impacts on Native American lands and cultural resources; and economic development costs and opportunities, including risk-induced socioeconomic impacts. Nevada believes that DOE's refusal to identify a preferred rail corridor in the Draft EIS makes a legally sufficient assessment of rail transportation risks and impacts impossible.

#### Page 6-2; Section 6.1 - Summary of Impacts of Transportation

The Draft EIS contains no assessment of operational impacts associated with spent fuel and HLW transportation (e.g., impacts to levels of service, queues, highway safety, etc.).

#### Pages 6-2 to 6-8; Section 6.1.1 - Overview of National Transportation Impacts

The Draft EIS contain no information about nuclear waste transportation routes, shipment numbers along those routes, and risks to specific states and communities located on or near transportation corridors to a Nevada repository. Furthermore, the Draft EIS contains no analyses of possible spent fuel and HLW transportation impacts on states, cities, and communities along potential shipping routes, despite the fact that, in responding to public comments on the 1985 Draft Environmental Assessment (EA) for the Yucca Mountain site, DOE committed to just such an assessment as part of the Yucca Mountain EIS:

“The DOE believes that the general methods and national average data used [in the EA] are adequate for this stage of the repository-siting process [i.e., the pre-site characterization stage]. 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'* (emphasis added).<sup>34</sup>

The irony of the situation is that DOE has, in fact, done the analyses needed to reveal specific highway and rail routes that would be used for waste shipments and to conduct required impact assessment along those routes. That information, however, is buried in data used to run computer models and is never made explicit in the Draft EIS. The Draft EIS contains no maps or other information showing which cities and communities along transportation corridors will be affected by this massive and unprecedented radioactive waste shipping campaign. One can only conclude that such an oversight is intentional and designed to suppress public interest in the project and participation in these public hearings.

Nevada believes that DOE has violated the National Environmental Policy Act by concealing crucial information used to support conclusions in the Draft EIS. Absent this information, persons affected by the transportation impacts of the Proposed Action have no way of determining the substantive and legal sufficiency of DOE's analysis. Such concealment of information can only diminish public confidence in DOE's ability to safely transport these highly radioactive materials.

Page 6-8 to 6-9; Section 6.1.2.1 - Land Use

DOE has not accurately identified or assessed the land use impacts of the Nevada transportation alternatives. Even where DOE has identified land use impacts, DOE has understated the nature and severity of the impacts. The failure by DOE to accurately describe the Proposed Action also prevents an adequate assessment of land use impacts. For example, the land use impacts associated with the development of ballast and sub-ballast quarries, solid waste disposal facilities, construction lay-down areas, and construction staging areas can not be assessed until these areas are identified.

The conclusions regarding land use impacts in the Draft EIS rely primarily on disturbed acreage. Although this is one measure of land use impacts, it is not the only one. For linear facilities such as a rail line, an assessment of land use impacts should also include an evaluation of the impacts of bisecting current and future land uses. As discussed above in the comment on Section 2.1.3.3.2, Nevada Rail Scenario, splitting an area with a rail line can have significant impacts on the entire area, not just the area within the right-of-

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<sup>34</sup> "Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area, Nevada," Appendix C, Comment-Response Document, p. C.2-37 (May, 1986).

way. This is particularly true for ranching operations. DOE has not assessed this type of land use impact in the Draft EIS.

DOE has identified a number of land use conflicts with the proposed rail line, but has not accurately characterized the impact of these conflicts. For example, potential rail corridors cross the Simpson Park Habitat Management Area (Carlin), the Old Spanish Trail/Mormon Road special recreation management area (Jean), Wilderness Study Areas (Valley Modified), and the Desert National Wildlife Range (Valley Modified). A rail line through these special land use areas would have significant impact on the purpose of these special areas. The EIS does not even discuss these impacts. It is particularly difficult to understand why DOE has not eliminated the Caliente-Chalk Mountain alternative. The U.S. Air Force has unequivocally stated that this alternative is unacceptable due to its impacts on the Nellis Air Force Range.

Proposed rail line corridors also cross areas of potential future community growth. Although DOE identifies these areas, the Draft EIS does not contain an assessment of the impacts of this conflict on future community growth patterns. The area of particular concern is the impact of the proposed Valley Modified route on growth in the north Las Vegas urban area.

Many of the areas crossed by potential rail corridors are currently remote, undeveloped areas. Much of the area is currently roadless, including Wilderness Study Areas. Regardless of the decision by the land management agency regarding classification as wilderness, construction of a rail line through a remote, roadless area will have land use impacts. These changes in land use should be identified and assessed.

From a land use perspective, the only rail alternative that does not have serious land use conflicts is the Caliente corridor. Even this corridor could impact the Nellis Air Force Range. All other rail alternatives cross or impact areas designated as special purpose land use. These conflicts are summarized below:

Caliente: Requires use of land on Nellis AF Range. Alternatives cross difficult terrain.

Carlin: Requires use of land on Nellis AF Range. Alternatives cross difficult terrain.

Bates Mountain Antelope Release Area

Simpson Park Habitat Management Area

Caliente/  
Chalk Mountain: Traverses Nellis Air Force Range, which is unacceptable to the Air Force.

Jean: Impacts Pahrump potential community growth.

Old Spanish Trail/ Mormon Road special recreation management area

Adjacent to Stateliner Wilderness Area.

Valley Modified: Encroaches on the Desert National Wildlife Range.

Impacts community growth in the north Las Vegas urban area.

Crosses Nellis A, B, & C and Quail Spring WSA.

Impacts Nellis AFB small arms range.

Impacts Indian Springs Auxiliary Field facilities.

DOE lists the Caliente/Chalk Mountain corridor as a non-preferred alternative, based upon the Air Force's statement that no route that traverses Nellis Air Force Range is acceptable. Based upon this comment, the route (and the associated heavy-haul route) should have been eliminated from the alternatives included in the Draft EIS and listed in Section 2.3 as an alternative considered but eliminated from detailed study.

#### Page 6-10; Section 6.1.2.3 - Hydrology

With respect to hydrology related to transportation-related impact, the Draft EIS states as follows:

"Surface water impacts during construction would be avoided by implementing good management practices to prevent and mitigate spills of pollutants and would avoid, minimize, or otherwise mitigate possible changes to stream flows. Therefore, DOE does not anticipate impacts to surface waters from the construction of a rail or heavy-haul implementing alternative."

"Potential for groundwater impacts would be limited. There would be the potential for temporary withdrawals of water from groundwater sources during the construction of a

branch rail line or upgrade to highways and construction of an intermodal transfer station.”

Page 6-45

“If DOE selected rail to transport spent nuclear fuel and high-level radioactive waste to the Yucca mountain site, it would also select one of the five routes. DOE would then prepare a more detailed floodplain/wetlands assessment of the selected alternative. The assessment in Appendix L presents a comparison of what is known about the floodplains, springs, and riparian areas and at the three alternative intermodal transfer station sites and along their associated heavy-haul routes. In general, wetlands have not been delineated along the alternative intermodal transfer station sites.”

Page L-18; L.4.2.1 - Effects along Rail Corridors

“Potential rail routes would cross many small and some large washes.”

“Based on current information, springs and riparian areas that may have associated wetlands occur within three of the rail corridors (Caliente, Carlin, and Caliente-Chalk Mountain.”

In the Draft EIS, DOE has not adequately studied the potential surface water impacts of either the rail or the heavy-haul alternative. The discussion on wetlands contained in Appendix L for all of the rail alternatives contains the statement, “no field searches or formal delineations of wetlands have been conducted along this route.” Wetlands have also not been delineated for the intermodal transfer station sites. Some of the rail corridors are known to cross or be near to significant springs, groups of springs, streams designated as riparian areas, or reservoirs associated with wetlands. Wetlands and riparian areas are a valuable resource in Nevada. Simply stating that impacts will be mitigated is insufficient.

The discussion of groundwater impacts is limited to impacts associated with groundwater withdrawals for construction activities and from infiltration of pollutants from potential spills during construction and operation. Most of the rail corridors cross rugged terrain where significant cuts will be required. These cuts could intercept groundwater flow. DOE has not provided sufficient information on the actual routes and the location and depth of cuts to assess these potential impacts.

Page 6-10; Section 6.1.2.3 - Hydrology

The Draft EIS should recognize the fact that an accident during waste transport could result in long term impacts to surface water and groundwater resources.

## Page 6-10; Section 6.1.2.4 - Biological Resources and Soils

DOE has significantly understated the impact to biological resources. Loss of habitat would not be limited only to the physical loss of habitat due to the construction of the rail line. The operation of the rail line would reduce the value of habitat crossed or near to the line, resulting in significantly greater loss in habitat than just the area physically within the rail line right-of-way.

All of the rail corridors except the Valley Modified cross and are near to critical habitat for many species of wildlife. Critical habitat is absolutely necessary for wildlife. Human activity, such as the operation of a rail line, in or even near critical habitat, can seriously degrade the value of that habitat for wildlife. This is especially true of linear facilities, such as a rail line, that pass through habitat areas. Without undisturbed access to critical habitat, the wildlife using that habitat may abandon large areas of year round habitat. Critical habitat crossed by or near to rail corridors includes bighorn sheep crucial winter range, mule deer crucial winter range, pronghorn winter range, sage grouse strutting areas, sage grouse nesting areas, caulker crucial habitat, and quail crucial habitat.

The Carlin and Jean corridors also cross migration corridors for big game. Linear facilities such as rail lines can significantly impact the movement of big game. This is particularly true in areas where steep cuts or fills are required. The Jean corridor also crosses a potential migration corridor for bighorn sheep from winter range in the Devil's Hole Hills to historic but currently unoccupied habitat at the northwest end of the Spring Mountains. Although currently not used, the disruption of this migration corridor would be a significant impact. Bighorn sheep are particularly susceptible to disease. An unoccupied habitat area represents the potential to establish another herd unit that could provide greater protection for the continued recovery of the bighorn sheep.

The Environmental Baseline File for Biological Resources (TRW 1999k) lists the following crucial habitats within each of the 400 meter wide rail corridors:

Caliente:	Bighorn Sheep Crucial Winter Habitat (Cedar Range), Mule Deer Crucial Winter Range (Cedar Range), Quail Crucial Habitat in Meadow Valley
Carlin:	3 Sage Grouse Strutting Areas (Grass Valley, Rye Patch Canyon, and Monitor Valley), Sage Grouse Nesting Area (Monitor Valley), Pronghorn Winter Range, Ungulate Migration Corridor Between Simpson and Tacoma Ranges, Bates Mountain Antelope Release Area, Simpson Park Habitat Management Area



Caliente B

Chalk Mountain: Bighorn Sheep Crucial Winter Habitat (Cedar Range), Mule Deer Crucial Winter Range (Cedar Range), Crucial Areas for Quail (Meadow Valley)

Jean: Crucial Bighorn Sheep Winter Habitat (Wilson Pass) and Winter Habitat (west of Wilson Pass), Bighorn Sheep Migration Corridor and Potential Migration Corridor, Crucial Caulker Habitat (Good springs), Crucial Areas for Quail (Goodsprings, Pahrump, Johnnie), and Mule Deer Winter Habitat

Although the Valley Modified corridor does not contain crucial habitat, it does cross the Desert National Wildlife Refuge (DNWR) in several places, including the Corn Creek Springs area. The DNWR was set aside primarily for desert bighorn sheep. It also provides habitat for mule deer, other desert mammals, and migratory birds. The Corn Creek area contains an environment filled with trees, pasture, and spring-fed ponds which attract a large number of migrating birds not common to the desert environment. The ponds are home to the endangered Pahrump poolfish.

Each of the corridors contain many additional biological resources within the corridor or within 5 kilometers of the corridor. Although these resources are identified in the Environmental Baseline File, the DOE makes no attempt to quantify the impacts of the rail line on most of these resources.

The Draft EIS does not contain an assessment of the impact of fencing on wildlife. This is inexcusable, since the impact of fencing was identified by the Bureau of Land Management as a major issue (TRW 1999k, p 5B1).

Potential transportation impacts to biological resources and soils are only curtly addressed in this section. There is insufficient information and substance for the section to be meaningful.

This section should also include a rigorous analysis of potential impacts from the spread of noxious or invasive plant species as a result of rail spur construction, heavy-haul highway improvement, and other activities that facilitate or promote the proliferation of noxious weeds.

See also comments on Section 6.3.2.1 (Biological Resources and Soils - page 6-46).

Page 6-11; Section 6.1.2.4 - Biological Resources and Soils

The Draft EIS states that “the potential impacts from upgrading Nevada highways for heavy-haul truck use would be small because modifications to roads would occur in previously disturbed rights-of-way.”

The amount of upgrade required varies significantly between the various heavy-haul route options. Portions of the Caliente-Chalk Mountain route will require significant upgrades, resulting in much more impact than some of the other route segments. Realigning roads to avoid significant grades and to improve curvatures will impact areas outside of current rights-of-way. The impact of the heavy-haul alternative on critical habitat for wildlife will be similar to that discussed above for the rail line alternative.

Page 6-11; Section 6.1.2.5 - Cultural Resources

Historic properties should be identified before effects are determined.

Page 6-14; Section 6.1.2.9 - Aesthetics

This transportation impacts overview section admits that the Caliente intermodal transfer station site “could cause impacts on the Class II lands of Kershaw-Ryan State Park” in terms of aesthetics. However, it goes on to imply that, because the character of the Meadow Valley Wash has already been modified by the existence of a rail line, the City of Caliente’s water treatment facility and agricultural uses, the impact would be slight, if not negligible. No other potential impacts were even acknowledged in the overview. We find this cursory analysis inadequate.

No mention is made of the fact that the Apex/Dry Lake intermodal transfer station sites are in close proximity to the Valley of Fire State Park exit off I-15. Furthermore, no attempt is made to analyze any impacts that may occur as a result of this proximity.

Page 6-17 to 6-20; Section 6.2 - National Transportation

The Draft EIS itself is substantively and legally deficient in its treatment (or lack of treatment) of key transportation issues that have both national and regional significance. The Draft EIS fails to evaluate the most likely, and potentially heaviest impact, modal mix (i.e., rail/truck/barge) scenario for civilian SNF shipments. The Draft EIS instead uses a bounding scenario approach, comparing a hypothetical mostly truck scenario with a hypothetical mostly rail scenario. The Draft EIS approach might be appropriate for a generic national transportation impact assessment, but it is not sufficient for a site-specific transportation impact analysis under NEPA.

The Draft EIS mostly rail scenario significantly misrepresents the extent to which legal-weight truck (LWT) shipments to the repository can be reduced by unrealistically assuming major infrastructure investments at reactor sites and unprecedented use of heavy-haul truck (HHT) and barge transport. Moreover, the Draft EIS implies that all modal-mix scenarios are equally probable.

Nevada believes that the Final EIS must evaluate a third transportation scenario based on the current transportation capabilities of reactor and storage sites. Planning Information Corporation (PIC) developed a current capabilities transportation scenario for the State of Nevada in September, 1996 (see Attachment V). Under this scenario, PIC assumed that neither utilities nor DOE transportation contractors would make major investments to upgrade cask loading capabilities or near-site infrastructure at reactor facilities that are currently unable to load rail casks or that currently lack direct rail access. Further, PIC assumed reactor sites without direct rail access would not utilize HHT or barge shipment options. Using these criteria, PIC identified 32 reactor sites that would likely ship by legal-weight truck and 40 sites that would likely ship by rail. PIC assumed major DOE HLW storage sites (Hanford, Idaho, Savannah River, and West Valley) would ship by rail.

Nevada staff and contractors have updated the PIC current capabilities scenario using data consistent with the Draft EIS projections for reactor-specific SNF inventories, cask capacities, and shipment distances to Yucca Mountain. Attachment W, Tables 1 to 6, provide a reactor-by-reactor overview of the updated current capabilities scenario for the Proposed Action and for DOE modules 1 and 2. PIC's 32 truck-only reactors account for 40% of the projected SNF inventory and would make 26,375 shipments over 39 years. The 40 rail-capable reactors account for 60% of the projected SNF inventory and would make 8,232 shipments over 39 years. DOE sites are assumed to make 5,939 shipments (including SPAR and GTCC) over 39 years, as stated in Table J-1 (p. J-10).

When combined with DOE's base case truck and rail routes (TRW1999u, Data, Ch.4, files bt.map.prn and ca.rail.prn), the updated current capabilities scenario provides a realistic basis for evaluating national transportation impacts. The same cannot be said for DOE's mostly truck and mostly rail scenarios. In particular, DOE's purported bounding scenario approach significantly underestimates the likely number of combined truck and rail shipments, the number and mileage of truck and rail routes, and the number of states affected by both rail and truck shipments. The number of states affected by both rail and truck shipments is particularly important for route-specific impact assessment, emergency response planning and training, and identification of affected Indian Tribes and local governments. Under DOE's mostly truck scenario, only 3 states are impacted by both rail and truck shipments; under DOE's mostly rail scenario, the number of states impacted by both modes is 22; under the updated current capabilities scenario, the number of states

impacted by both rail and truck shipments is 32. On this important measure, DOE's scenarios clearly fail to bound the full range of impacts of possible modal-mix options.

Page 6-19; Figure 6-8 - Map of U.S. Interstate Highway System

Figure 6-8 should be replaced with the map of national truck routes distributed by DOE at the Draft EIS Public Hearing in Chicago on February 1, 2000. (See Attachment X)

Page 6-21; Figure 6-9 - Map of U.S. Rail System

Figure 6-9 should be replaced with the map of national rail routes distributed by DOE at the Draft EIS Public Hearing in Chicago on February 1, 2000. (See Attachment Y)

Page 6-27 to Page 6-30; Section 6.2.4.2 - Transportation Accident Scenarios

The Draft EIS relies heavily upon the Modal Study (Fischer et al., Shipping Container Response to Severe Highway and Railway Accident Conditions, 1987) categories and data for analysis of severe accidents. The Draft EIS uncritically adopts and incorporates the following deficiencies in the Modal Study estimates of accident severities and probabilities of severe accidents.

**Use of "mid-lead" temperature as parameter determining accident severity.**

Lead (Melting Point 621°F) will stabilize the inner core temperature in the event of a fire until it is completely melted. This has the effect of insulating the inner core from temperature increases for an extended period of time. Uranium and/or steel, with a much higher melting point, will not melt, resulting in an inner core temperature that will rise constantly with heat input. Therefore, inner cores of newer casks are expected to have higher temperatures during a fire of a given intensity.

The use of mid-lead temperature results in grouping of all fires with temperature greater than 1050°F into one consequence category, since lead-nickel alloying occurs here, weakening the integrity of the older casks. Since uranium and/or stainless steel will behave differently under temperature duress, new classifications based on these properties must be used for categorizing fire intensities.

**Use of "reference cask" containing a water jacket neutron shield.**

The Modal Study models the dead air space resulting from the evaporation of the water jacket neutron shield to reduce heat transfer from a fire to the cask by over 70%. Modern casks use polypropylene, not water jackets; hence, the estimated heat transfer rate in fire events is a significant underestimate of the behavior of modern casks. (Audin states this may result in a reduction in the time it takes to melt the lead cask from 1.09 hours to 20

minutes). For the uranium and/or stainless steel shield, this means quicker increases in temperature than those postulated by the Modal Study, resulting in a reduction in the fire severity needed to cause a given accident condition.

**“Lead cask bias” used to select most appropriate measurement parameter.**

The decision to use strain on the inner cask wall as the primary measure of cask response is based on lead’s tendency to “slump” when subjected to high loading, resulting in high strains on the inner cask wall. However, uranium and/or stainless steel are strong and rigid and thus will not slump. Rather, the force from impacts will be transferred to the joints and welds of the cask, likely resulting in a greater force being applied to them than those in a lead cask. The choice of strain as the sole measurement parameter for physical duress will likely lead to an underestimation of the damage caused to newer casks through rupture of welds and seals in the event of an accident. Therefore, new experiments must be performed to model this behavior.

**Incorrect use of “distribution” and “frequency” of velocities.**

The Draft EIS states that, even though the average speed limit on national interstates has increased since the Modal Study, the distribution of accidents, and the frequency distribution of accidents, on the highways is not likely to change. However, there is no evidence cited to support this statement. The National Highway Safety Traffic Administration (NHTSA 1998), along with numerous other agencies, have provided evidence that increases in speed limit lead to more accidents, more fatalities, and a greater proportion of vehicles traveling at higher speeds. All of these suggest that DOE is incorrect in claiming that increased speed limits will not affect accident severity distributions.

In one study assessing the change in Interstate fatalities in states that raised the speed limit in 1995, the NHSTA discovered that “Interstate fatalities experienced a statistically significant increase in those states that raised their posted speed limits late in 1995 or early in 1996.” (NHTSA 1998) Further, the Insurance Institute for Highway Safety reported that distributions of travel velocities do indeed change with increased speed limits, stating that “in general, higher speed limits lead to greater proportions of cars traveling at very high speeds.” For example, the Institute cited traffic statistics in New Mexico, finding that “the proportion of motorists exceeding 70mph grew from 5 percent shortly after speed limits were raised (from 55 to 65 mph) to 36 percent.”

This shows that the Draft EIS statement that traffic velocity distributions will not be affected is incorrect, which leads to the conclusion that the probabilities of severe accidents used by the Draft EIS are also incorrect and likely to be underestimates. This provides another reason why the Modal Study is not useful or relevant to current transportation conditions.

**Improper assumptions regarding the location of severe accidents.**

The Modal Study correlated severe accidents with high velocities, concluding that the most severe accidents will take place, both for rail and truck, in rural environments. However, most severe rail accidents take place at downgrades, which are as likely to be located in suburban areas as rural ones. Further, the probability of a severe truck fire is greater in urban and suburban environments than in rural ones (Resnikoff, 1993).

In determining severe accident scenarios, the Draft EIS assumed that severe accidents had an equal probability of occurring anywhere, with the probability in each population zone being determined by the length of time each truck or train passes through it. Since trucks and trains spend less time in urban zones, some of the most severe accident scenarios are considered “not reasonably foreseeable” in urban areas. Accident data does not support the assumption that severe accidents are randomly distributed (Resnikoff, 1993). Therefore, the Draft EIS needs to assess the consequences of these most severe accidents in urban zones.

**Improper exclusion of most severe accident scenarios.**

The Modal Study used as its “average highway conditions” a stretch of Interstate 5 in Los Angeles and Orange counties. For example, it tallied the number, height, and geographic conditions of the bridges on this stretch and used these to estimate the number of bridges of a certain height. This was then used to estimate how many tall bridges existed in the entire nation for spent fuel trucks to cross. Using this, it was determined that an accident involving a truck falling off a high bridge was not “reasonably foreseeable” and its consequences were not determined. Since this stretch of highway is dominated by urban areas, the distribution of bridge types is biased in favor of small, short bridges, like the ones that cross over other roads. This is not representative of national conditions and leads to the unnecessary exclusion of a potentially disastrous consequence.

The Modal Study assumes that the probability of train accidents involving falling off of a bridge is the same as that for the highway scenario, with the geographic conditions also taken from the highway estimations. More clearly, the Study used data taken from Interstate 5 to estimate the geographic conditions of national train routes, including bridge heights. Thus, the same argument given for the highway scenario holds here, but more so since there is no proof that highway and rail conditions are similar.

The method of rejecting accidents having a yearly probability less than one in 10 million is arbitrary and incorrect when performing a probabilistic risk assessment. The product of the probability and the likely consequences are what determine significance in a risk assessment.

DOE consistently offers estimations of health effects due to transportation without giving a range of likely effects in the event of an accident. This is based on the assumption that the effects given are “conservative.” However, the points raised here show that the studies are not conservative. Unless new studies are performed, a range of possible health effects should be given.

If DOE insists on using the “reasonably foreseeable” criteria of 1 in 10 million mentioned above, improper accident distribution data, unknown cask response to accident conditions, and improper estimation of accident probabilities (all mentioned above) will make some circumstances deemed not “reasonably foreseeable” in the Modal Study “reasonably foreseeable.” These events must be considered in any acceptable consequence analysis.

#### Page 6-29; Box - The Modal Study

The entire discussion of the Modal Study must be revised to address the both the technical and procedural implications of the Modal reassessment currently being conducted by the U.S. Nuclear Regulatory Commission (NRC). In November 1999, the NRC began taking public comments on a proposed study assessing the risks of spent nuclear fuel transportation. The proposed study, to be conducted by Sandia National Laboratories, is intended to update the Modal Study with specific reference to the increased number of shipments, changes in shipping cask designs, and changing the transportation environment in which repository shipments would take place. One particular problem with the Draft EIS reliance upon the original Modal Study is the timing of the NRC reassessment. The NRC will not complete its Modal Study update until well after DOE is scheduled to publish the Final EIS for Yucca Mountain. DOE representative Dwight Shelor acknowledged this potential problem at the initial NRC meeting in Bethesda, Maryland, on November 16, 1999.

The Draft EIS acknowledges the State of Nevada’s criticisms of the Modal Study, but the criticizes Nevada for not suggesting “the use of alternative analyses or models” and for not offering “differing values for use in estimating consequences or risks of severe accidents.” The Draft EIS further criticizes Nevada for not identifying “examples of actual accident conditions and damage to structures that could support different values for release fractions or release probabilities.” (p. 6-29) In response, Nevada makes the same recommendations to DOE that Nevada has made to the NRC regarding assumptions and methods of analysis to be used in the Modal Study update. Those recommendations are contained in Attachment Z and are intended to be treated as comments on this section of the Draft EIS.

Page 6-30; Box - Transportation Accidents

The Draft EIS incorrectly assumes that simply requiring contractors to comply with ANSI N14.27-1986-1993) will guarantee timely availability of the trained personnel and special equipment necessary for recovery and reshipment of casks damaged in severe accidents. In particular, DOE must demonstrate the economic and technical feasibility of recovering and re-shipping large (125 tons or greater loaded weight) rail casks such as those proposed for transport of civilian and naval reactor SNF. The analysis must consider the possibility of significant loss of shielding and/or containment as a result of a severe accident or terrorist attack. The analysis must further consider the possibility of such incidents occurring in difficult terrain comparable to that found along potential rail routes identified in the Draft EIS, such as the Union Pacific railroad between Uvada and Elgin, and along potential HHT routes identified in the EIS, such as SR375 through Hancock Summit.

Page 6-31 to 6-32; Section 6.2.4.2.1 - Impacts from Accidents - National Mostly Legal-Weight Truck Scenario

Impact Issues Specific to Use of GA 4/9 Casks

The Draft EIS mostly legal-weight truck national transportation scenario fails to consider unique circumstances of the transportation system being evaluated. Specifically, the Draft EIS assumes that all shipments will be made in the new General Atomics GA4/9 truck casks, but fails to explicitly address aspects of the design and performance of those casks which may increase the probability and consequences of highway accidents.

Nevada's 1995 scoping comments requested that DOE consider the following issues. In order to achieve a four-fold increase in cask capacity, the GA4/9 casks utilize a number of new design features and materials. Further, the weight of the loaded GA4/9 cask requires that it be used in conjunction with a specially designed trailer, a lower weight cab-over-engine tractor, and a single fuel tank, in order to comply with legal weight limits. To date, there is no operating experience with spent fuel shipments in actual GA 4/9 casks, although DOE contractors have conducted operational tests using mock-ups. To our knowledge, no GA 4/9 casks have yet been manufactured under the recently issued NRC certificate. The validity of the Draft EIS LWT transportation risk assessment therefore rests entirely upon speculative assumptions about the performance of casks which have never been used.

Nevada believes the Draft EIS must demonstrate that the GA4/9 cask, trailer, and tractor system is appropriately designed for use in a decades-long, nationwide shipping campaign to Yucca Mountain. DOE's risk assessment must evaluate issues such as: the



power and handling characteristics of the tractor relative to long hauls in mountainous terrain under winter driving conditions; noise and vibration levels within the cab, and the potential impacts on driver fatigue and increased probability of human error; and the constrained fuel capacity of the tractor, requiring refueling every 300 to 400 miles, which could may additional safety and safeguards risks. The performance of GA4/9 cask's depleted uranium gamma shield in high-speed collisions with relatively unyielding structures, and the vulnerability to terrorist attack with armor piercing weapons and commercial shaped charges, must specifically be evaluated.

#### Impacts of Maximum Reasonably Foreseeable Accident

The Draft EIS underestimates the consequences of a maximum reasonably foreseeable accident. The consequence assessment reported in Table 6-11 considered a cask loaded with 26 year-old PWR SNF. The Draft EIS should have evaluated a range of accident scenarios, including a cask loaded with 10 year-old PWR SNF and a range of other critical assumptions, including release height, atmospheric dispersion models, and downwind population densities. Nevada believes that RADTRAN and RISKIND analyses of the same accident involving 10 year-old fuel and other credible alternative assumptions would result in latent cancer fatalities higher by a factor of 2 to a factor of 40 or more, that is, 10 to 200 latent cancer fatalities.

Further, the NRC recently authorized utilities to plan for truck shipments of 5 year-cooled, high enrichment (5 percent), high-burnup (62,000 MWR/MTHM) fuel to Yucca Mountain (Addendum 1 to NUREG-1437), and the discussion at page 6-12 indicates that DOE is not only aware of, but concurs in, the NRC assessment. Therefore, a legally sufficient evaluation of the maximum reasonably foreseeable accident should include a RADTRAN and RISKIND analysis of the same accident involving a GA 4 cask loaded with SNF having the same maximum radiological characteristics approved by the NRC. The human health effects of the same accident could be hundreds of times greater than those reported in Table 6-11

Finally, the Draft EIS fails to provide any estimate of the economic impacts of the maximum reasonably foreseeable accident reported in Table 6-11. A release of radioactive materials sufficient to cause a 9,400 person-rem population dose would clearly involve significant damage to the physical environment. Under NEPA, the Draft EIS must estimate the economic cost of remediation. Cleanup activities alone could cost hundreds of millions, or even billions, of dollars.

Page 6-32 to 6-33; Section 6.2.4.2 .2– Impacts from Accidents – National Mostly Rail Scenario

The Draft EIS underestimates the radiological consequences of a maximum reasonably foreseeable rail accident by a least a factor 15, and by up to a factor of 40 or more. The number of latent cancer fatalities could be 1,380 or more.

Under contract with the State of Nevada, Radioactive Waste Management Associates (RWMA) prepared a bounding scenario analysis of the a accident reported in Table 6-12, using the RADTRAN and RISKIND models and a range of credible alternative assumptions about SNF age and radiological characteristics, atmospheric dispersion, and population densities. Nevada is submitting the RWMA analysis as Attachment AA.

The Draft EIS fails to provide any estimate of the economic impacts of the maximum reasonably foreseeable rail accident reported in Table 6-12. Under contract with the State of Nevada, Radioactive Waste Management Associates (RWMA) prepared an estimate of the economic impacts of the accident reported in Table 6-12, using the RADTRAN and RISKIND models and a range of credible alternative assumptions about cleanup levels, SNF age and radiological characteristics, atmospheric dispersion, and population densities. RWMA concluded that the economic impacts of cleanup and other post-accident costs could range between \$3.2 billion and \$9.4 billion. Nevada is submitting the RWMA analysis as Attachment BB.

Page 6-33 to Page 6-34; Section 6.2.4.2.3 - Impacts of Acts of Sabotage

The Draft EIS underestimates the impacts of a successful terrorist attack on a truck cask by at least a factor of 10. The population dose from the postulated attack could be at least 310,000 person-rem, resulting in at least 150 fatal cancers.

The release and resulting consequences could be ten times greater than reported in the Draft EIS, according to the new Sandia study, if the weapon fully perforated the cask.[Luna, Neuhauser, and Vigil, 1999, p.20] Based on the Army Ballistics Research Laboratory 1982 peer review of the original Sandia report [Sandoval, 1982], full perforation of a truck cask by the reference weapon (the M3A1 military demolition device) should have been assumed in the 1999 analysis. At a minimum, the Draft EIS should have used a bounding scenario approach, resulting in a range of estimated impacts between 31,000 and 310,000 person-rem population dose and 15 to 150 latent cancer fatalities.

The Draft EIS failed to conduct a systems analysis of the potential impacts of sabotage and terrorism during all phases of transportation, including planning, storage prior to transport, cask loading, transportation, intermodal transfer, lag storage at the receiving

facility, and cask unloading. Nevada is particularly concerned that DOE ignored the potential for attacks at intermodal transfer stations and on large rail casks during transport on slow-moving heavy haul trucks.

The Draft EIS also failed to evaluate the full range of potential sabotage and terrorism events, including terrorist attacks on transportation infrastructure used during nuclear waste shipments, attacks involving capture of a shipment and use of high-energy explosive devices against a cask, and direct attacks upon shipping casks using antitank missiles.

The Sandia analysis underestimates sabotage consequences for the following reasons:

1. Sandia used the military definition of man-portability rather than the Commission's definition of the design basis threat in selecting the reference weapons used in the analysis. As a result, Sandia failed to consider weapons such as the TOW and Milan missiles which are capable of completely perforating rail as well as truck casks.
2. Sandia failed to consider credible attack scenarios involving use of more than one penetrating weapon, use of an incendiary device in conjunction with a penetrating weapon, and use of commercial shaped charges which are more efficient metal penetrators than the M3A1 military demolition device.
3. Sandia's "swept volume" method of estimating the release from the cask is subject to alternative interpretations, especially when coupled with consideration of blast temperature effects. Sandia apparently did not consider the potential contribution of fuel oxidation to generation of respirable fines in any instance where the weapon completely perforated the cask.

Attachment CC provides additional critical commentary on the Sandia report and the Draft EIS assessment of sabotage impacts.

The analysis in the Draft EIS only considers impacts of "successful" sabotage attempts on a cask (truck or rail). This analysis does not address impacts that are caused by the need to prepare for and prevent sabotage and terrorist actions. Such impacts will accrue directly to the State of Nevada in terms of additional security and law enforcement costs and requirements.

The Draft EIS fails to address the fact that chances for a terrorist or sabotage incident (successful or otherwise) are increased when these shipments arrive in Nevada and travel a standard route to the repository. Even if "successful" attempts do not breach the

integrity of the casks, impacts of any such incident to affected State agencies, highway users, and affected communities are not addressed in the Draft EIS. In other words, regardless of the adequacy or inadequacy of the assessment of impacts associated with a “successful” sabotage or terrorist attack, the Draft EIS should have examined impacts associated with the increased risk that a Yucca Mountain shipping campaign poses for the State of Nevada, its citizens, and communities.

Such impacts should include not only the costs associated with preparation and response, but also costs and impacts on the State’s tourism/visitor dependent economy, should there be a terrorist or sabotage incident involving nuclear materials.

Page 6-34; Section 6.2.5 - Environmental Justice

The Draft EIS refers only to Native Americans affected by national transportation in Idaho. Proper identification of the national highway and rail routes used in the Section 6 analysis would have revealed additional impacts on Native American populations in other states. Analyses prepared for the State of Nevada by Planning Information Corporation identified the following potentially affected Indian Reservations:

Arizona	Hualapai and Navajo (I-10, I-40; BNSF/UPRR);
California	Agua Calientes, Cabazon, Chemehuevi Valley, Ft. Mojave, Ft. Yuma, Morongo, Torres Martinez, and Hoopa Valley (I-10, I-40/I-15; BNSF/UPRR);
Florida	Hollywood (I-95, FECR);
Iowa	Mesquakie(Sac & Fox) (UPRR);
Kansas	Potawotamie (UPRR);
Minnesota	Prairie Island (CP/Soo);
Nebraska	Omaha and Winnebago (UPRR);
New Mexico	Acoma, Canoncito, Isleta, Laguna, Navajo, and Zuni (I-10, I-40; BNSF/UPRR);
New York	Cataaugas and Tonawanda (I-90, Conrail)
North Carolina	Cherokee (I-40)

Oklahoma	Choctaw, E. Shawnee, Kialegee Creek, Kickapoo, Miami, Modoc, Osage, Ottawa, Peoria, Quapaw, Sac & Fox, and Thlopthlocco Creek (I-35, I-40; BNSF/UPRR);
Oregon	Umatilla (I-84; UPRR);
Utah	Goshute, Ouray, Skull Valley, and Unitah (I-84/I-15/I-80/US93A; UPRR)
Washington	Yakima (I-84; UPRR)
Wisconsin	Oneida (WCRR)

The Draft EIS does not attempt to define transportation-affected and potentially-affected Indian lands and resources. Nevada defines affected lands and resources to include the following: (1) reservations crossed by potential shipping routes; (2) off-reservation ceded lands, where Tribes retain treaty rights or other legally recognized user rights crossed by potential shipping routes; (3) reservation lands and off-reservation lands within transportation emergency evacuation zones along potential shipping routes; (4) reservation and off-reservation lands which could be contaminated by air or water transport of radioactive materials released in a severe transportation accident or terrorist incident (generally within 50 miles down-wind, down-stream, or down-gradient of a potential shipping route); (5) reservations whose highway access would be disrupted by a nuclear waste transportation emergency; and (6) off-reservation lands along potential shipping routes where Tribal personnel would likely be involved in transportation emergency response.

The Draft EIS gives insufficient consideration to the major concerns identified by potentially affected Indian Tribes and by the National Congress of American Indians. These concerns include: (1) Tribal authority to regulate shipments across reservations; (2) emergency response planning and training for Tribal personnel; (3) advance notification of shipments and shipment monitoring; (4) protection of Native American religious and cultural sites, plants, and animals, both on and off reservations; (5) cultural implications of potential radiological contamination of Indian lands and the cultural implications of cleanup activities involving non-tribal personnel; and (6) adverse economic impacts of public perception of risk, especially adverse impacts on tribal tourism and recreation businesses. Moreover, except for tribes in Idaho, DOE failed to identify potential Indian reservations and communities in the Draft EIS and in the public hearing notices, and failed to provide financial assistance to facilitate independent technical review of the Draft EIS by potentially affected Indian Tribes.

Page 6-35; Section 6.3 - Nevada Transportation

Implementing Alternatives for Nevada Legal-Weight Truck Transportation Scenarios: The failure of the Draft EIS to evaluate implementing alternatives for LWT transportation in Nevada is a major deficiency. Nevada's 1995 scoping comments stated: "The DOE must address the potential implications of state route designation decisions in the Draft EIS." Nevada specifically urged DOE to evaluate the impacts of use of the potential alternatives identified as NDOT Routes A, B, and E. The Draft EIS identifies the six potential state-designated alternatives in Appendix J, Section J.3.1.3 and Table J-47. The Draft EIS should have fully evaluated the impacts of using these alternative highway routes in Section 6.3.1.

Land Use and Ownership: The Draft EIS makes note of land use and ownership impacts to landowners due to the creation and use of a branch rail line or heavy-haul facility. It does not account for impacts to the Nevada Department of Transportation (NDOT) as a landowner. Negative impacts include corridor degradation, loss of pavement structure, and operational disruptions (queues, etc.). DOE has also failed to assess what will happen to facilities, shipments, and operations when the time comes to rebuild or resurface the roadways sustaining this shipping campaign. These roadways will have to be refurbished, since axle loads of the kind proposed for spent fuel and HLW shipments were never anticipated and would accumulate and reduce the service life of affected roadways. The Draft EIS does not consider the fact that during a 24 year shipping campaign, roadways will deteriorate and must be rebuilt. In section 6.3.3.1, the Draft EIS states that resurfacing would occur every eight years. What 'ESAL' calculations are driving this number? What happens to shipments when highway construction closes down roadways for months at a time? In addition, it would appear that field inspections of 'choke points' and areas of operational concern have not been effectively carried out. Areas such as Hancock Summit, for example, may not be able to legally allow a heavy-haul vehicle configuration to pass through the summit and roadway cut. The turning radius may be too small to allow the vehicle to traverse the roadway.

Page 6-37; Section 6.3 - Nevada Transportation

The assessment of socioeconomic impacts associated with Nevada transportation fails to address impacts on State and local governments. Specifically, any response to an incident, accident, or even a simple vehicle breakdown will impact a large group of responders. The Draft EIS does not discuss facilities, equipment, and mitigation, etc. that will be required. It refers only to the transporter's responsibilities regarding these issues, not the impact on public safety (response) agencies. Some of the issues are:

- Availability of equipment to deal with the large (size and weight) transportation casks in the event of vehicle breakdowns, load shifting, accidents, etc.; and
- Response costs for breakdowns and incidents/accidents. Timely responses would require staged equipment, trained and equipped personnel, and the associated infrastructure to support them.

Page 6-38; Section 6.3.1.1 - Impacts to Biological Resources

See comment for Page 6-10.

Page 6-39; Section 6.3.1.2 - Impacts to Occupational and Public Health

See comments on Section 4.1.7.

Page 6-39 to 6-40; Section 6.3.1.2.1 - Impacts from Incident-Free Transportation

The Draft EIS fails to consider unique local conditions along potential highway routes in Nevada which could result in significantly higher collective doses and significantly higher doses to maximally exposed individuals. The Draft EIS analyses using the RADTRAN and RISKIND models do not reflect unique local conditions.

Individuals in Nevada who reside, work, or are institutionally confined at certain locations within 6 to 40 meters (20 to 130 feet) of a nuclear waste highway route, or within 6 to 50 meters (20 to 160 feet) of a nuclear waste rail route, could potentially receive yearly radiation doses equal to a significant percentage of, or even in excess of, average annual background doses (360 mrem/year). Such exposures could occur under circumstances where: (1) residences, workplaces, or certain institutions (especially schools, prisons, or long-term health care or retirement facilities) are located near route features or segments which would require nuclear waste trucks or trains to stop and start again, or travel at very slow speed; (2) the number of shipments is high enough (one to several casks per day) that opportunities for exposures occur frequently at the same locations, and (3) the individuals residing, working, or confined at near-route locations are regularly present to be exposed to a significant portion (if not all) of the shipments which occur annually.

All three circumstances exist along some of the truck routes identified in the Draft EIS. Route segments of special concern include US 95 from Las Vegas to Lathrop Wells; the so-called NDOT B Route, US 93A, US 93, US 6, and US 95 from West Wendover to Lathrop Wells (especially where vehicle stops and/or left turns are required in West

Wendover, McGill, Ely, Tonopah, Goldfield, and Beatty); and SR160 from I-15 to US95 (especially where vehicle stops are required in Arden and Pahrump).

For example, there are locations along the NDOT B Route in West Wendover, Ely, Tonopah, Beatty and Goldfield where exposure times at a distance of 6 – 10 meters could average 2 minutes per LWT shipment. Under the proposed action, mostly truck scenario, the maximally exposed individual at these locations in Nevada could potentially receive annual doses ranging from 150 mrem to 260 mrem, equivalent to 42% to 62% of the average annual background radiation dose.

The Draft EIS fails to fully evaluate the impacts of routine exposures to individuals stuck in traffic jams (also referred to as gridlock incidents). The Draft EIS assumption that this would be a one time occurrence for the affected individual is an undocumented speculation. Given the regularity of commuting patterns, the opposite assumption may be more likely. Gridlock is likely to occur on a regular basis on I-15, I-215, and US95 in Las Vegas. Gridlock involving a large number of vehicles could also occur frequently in a rural area, for example, as a result of highway construction.

The Draft EIS fails to address the types of questions frequently asked by members of the public. How many people could be exposed to 40 mrem in a worst case gridlock incident (e.g., cask jammed up against school bus, city bus, tour bus, etc.)? Would the same 40 mrem exposure over 4 hours pose greater health risks to pregnant woman and unborn children, young children, or persons already exposed to higher than average levels of radiation? Should a health effects analysis address possible psychological consequences, or trauma-related illnesses, which might result from a gridlock incident?

#### Page 6-41; Box – Maximum Reasonably Foreseeable Accident Scenarios in Nevada

The Draft EIS assumes that the maximum reasonably foreseeable accident scenarios for Nevada are the same as for national transportation. This assumption is absolutely incorrect, and by itself constitutes a strong argument that the Draft EIS is legally insufficient. DOE has completely ignored Nevada's scoping comments regarding unique local conditions in Nevada which require DOE to evaluate certain low-probability, high-consequence accident scenarios which are more likely to occur in Nevada than elsewhere. Nevada's 1995 scoping comments specifically recommended that DOE evaluate a truck cask collision involving another truck loaded with commercial or military explosives, a truck or rail cask involved in a massive infrastructure failure or natural disaster, and a rail or truck cask involved in an accident with a military aircraft. Our comments emphasized that "Nevada is particularly concerned accidents involving trucks and aircraft carrying military explosives."



The Draft EIS must specifically evaluate Nevada truck accidents involving commercial and military explosives because of the high concentration of mining, munitions storage, and military training activities in Nevada. The Draft EIS must specifically consider the frequency of munitions shipments to and from the Hawthorne military depot and historical experience with truck accidents on US95 involving explosion of military cargoes.

The Draft EIS must specifically evaluate massive infrastructure failure, such as a bridge or overpass collapse, because of the presence of such structures along Nevada highway routes, especially along I-15, I-215, and US95 in the Las Vegas Valley. The Draft EIS must specifically evaluate truck or rail cask performance in infrastructure failures coupled with a natural disaster, such as a severe earthquake or massive flooding, because the risk of such disasters is considerably higher in Nevada than the national average for such occurrences.

The Draft EIS must specifically evaluate nuclear waste transportation accidents involving military aircraft carrying live munitions because of routine activities at Nellis Air Force Base and other military aviation facilities in Central and Southern Nevada. All of the rail and highway routes to Yucca Mountain identified in the Draft EIS cross flight paths routinely used for military training and testing. The Draft EIS discussion of aircraft accidents in Appendix J completely ignores the potential for cask damage by military explosives. Nevada reminds DOE that the 1986 EA for Yucca Mountain acknowledged that these military activities constitute a unique local condition which might subject shipments to forces beyond those bounded by the NRC cask performance standards.

Finally, there are many locations along Nevada rail and highway routes identified in the Draft EIS where the nonresident population regularly exceeds the resident population, especially in Clark County. Analysis of maximum reasonably foreseeable rail and truck accident impacts in Clark County and other similar locations must include nonresident population density.

#### Page 6-43; Section 6.3.2.1 - Impacts Common to Nevada Branch Rail Line Implementing Alternatives

The Draft EIS underestimates the difficulty of constructing a new rail line to Yucca Mountain. The Carlin, Caliente, or Caliente-Chalk Mountain routes would constitute the longest new rail construction project in United States since the World War I era. Construction of the Jean or Valley modified routes would be the second longest U.S. new rail construction project in the past 70 years. The Draft EIS assertion that rail line construction along any of the routes would take an estimated 2.5 years is unjustifiably optimistic considering the difficult terrain, environmental sensitivity, and high probability

that previously unidentified Native American cultural resources will be discovered only after construction activities begin. The construction period could be 5 to 7 years.

The Draft EIS further underestimates the difficulty of rail access preconstruction activities, especially environmental reviews and approvals, acquisition of rights of way across both public and private lands, and unresolved Native American rights issues regarding ceded treaty lands. Legal challenges could easily delay construction for 5 to 10 years.

The maximum cost estimate of \$800 million for Nevada rail transportation, based on an estimate for the Caliente route, is completely unrealistic unless DOE plans to sacrifice safety by constructing a rail line that barely meets the minimum Federal Railroad Administration requirements. Nevada is particularly concerned that DOE contractor studies have recommended operating the line without a state of the art computerized train control system. DOE's cost saving measures include shipping loaded rail casks in general freight trains, which will require switching cars at the connection point. DOE's proposal to routinely park loaded rail cask cars on a side track for up to 48 hours is unprecedented and will result in a separate legal challenge.

The Draft EIS provides insufficient information about rail access spur system specifications, construction, and operations to allow the complete assessment of impacts and risks required under the National Environment Policy Act. The Draft EIS provides insufficient information on cut and fill requirements; ballast, rail weight, and tie materials; platform, ditch, and bench dimensions; grade crossing separations (DOE contractors have recommended rail over road), crossing signals and road crossings; administration and maintenance facilities, including remote water supplies and sanitation; seismic and flood hazard standards; and train control signal systems.

The Draft EIS provides incomplete and contradictory information on rail operating assumptions, particularly regarding maximum operating speeds, crew change and way station requirements, and potential shared use of the rail line. The Draft EIS does not contain a meaningful discussion of DOE's assumptions about average and maximum operating speeds on the branch rail line to Yucca Mountain. The Draft EIS summary gives the erroneous impression that even the longest routes can be traversed in one day or less, eliminating the need for crew changes and way stations. (p. S-55) In response to a question at the Crescent Valley public hearing, DOE staff informed the State of Nevada's Transportation Advisor that the travel times reported in the Draft EIS Summary were calculated on the assumption that trains would travel at speeds up to 50 miles per hour or more. Additionally, the Draft EIS fails to address the safety and environmental implications of potential shared use of the rail line for shipments of commercial explosives, military weapons and munitions, petroleum products, and other hazardous

materials. These Draft EIS deficiencies, combined with DOE's failure to designate a preferred rail route, result in a legally insufficient assessment of rail transportation risks and impacts.

Land Use and Ownership: The Draft EIS fails to adequately evaluate potential land use impacts for the various rail spur alternatives. Table 1 below shows the land use conflicts that should have been fully studied:

TABLE 1 Comparison of Rail Spur Corridors Land Use and Biological Resources Impacts				
Caliente	Carlin	Caliente– Chalk Mtn.	Jean	Valley Modified
Land Use Impacts				
Requires use of land on Nellis AF Range. Alternatives cross difficult terrain.	Requires use of land on Nellis AF Range. Alternatives cross difficult terrain.	Traverses Nellis AF Range, which is unacceptable to AF.	Impacts Pahrump potential community growth	Impacts community growth in the north Las Vegas urban area.
	Bates Mountain Antelope Release Area		Old Spanish Trail/ Mormon Road special recreation management area	Crosses Nellis ABC and Quail Spring WSA.
	Simpson Park Habitat Management Area		Adjacent to Statelier Wilderness Area	Impacts Nellis AFB small arms range.
				Impacts Indian Springs Auxiliary Field facilities.
				Encroaches on the Desert National Wildlife Range.
Biological Resources Impacts				
Biological Resources Within Corridor: 32 Within 5 KM: 77	Biological Resources Within Corridor: 39 Within 5 KM: 171	Biological Resources Within Corridor: 23 Within 5 KM: 79	Biological Resources Within Corridor: 16 Within 5 KM: 67	Biological Resources Within Corridor: 6 Within 5 KM: 29

<p style="text-align: center;">TABLE 1 Comparison of Rail Spur Corridors Land Use and Biological Resources Impacts</p>				
Caliente	Carlin	Caliente– Chalk Mtn.	Jean	Valley Modified
Bighorn Sheep Crucial Winter Habitat (Cedar Range)	3 Sage Grouse Strutting Areas (Grass Valley, Rye Patch Canyon, and Monitor Valley)	Bighorn Sheep Crucial Winter Habitat (Cedar Range)	Crucial Bighorn Sheep Winter Habitat (Wilson Pass) and Winter Habitat (west of Wilson Pass)	Desert National Wildlife Range
Quail Crucial Habitat in Meadow Valley	Pronghorn Winter Range	Crucial Areas for Quail (Meadow Valley)	Crucial Caulker Habitat (Good springs)	
Habitat Areas for Bighorn Sheep, Deer, Pronghorn, and Waterfowl	Ungulate Migration Corridor Between Simpson and Tacoma Ranges	Habitat for Mule Deer, Pronghorn, and Waterfowl	Crucial Areas for Quail (Goodsprings, Pahrump, Johnnie)	
8 Wild Horse and Burro Herd Management Areas	Habitat Areas for Bighorn Sheep, Elk, Pronghorn and Mule Deer	2 Wild Horse and Burro Herd Management Areas	Mule Deer Winter Habitat	
			3 Wild Horse and Burro Herd Management Areas	
			Mesquite Bosques Important to Migratory Birds	

Page 6-84; Section 6.3.3 - Impacts of Nevada Heavy-Haul Truck Transportation Implementing Alternatives

The Draft EIS fails to demonstrate the feasibility of heavy-haul truck (HHT) transportation from an intermodal transfer station in Nevada to the proposed repository. In the United States there is no experience with long-distance HHT transportation of SNF or HLW, and only limited experience moving smaller rail casks (70 tons loaded weight) short distances by truck. There is only limited experience in Europe with short HHT movements of large rail casks. There is no experience anywhere moving SNF hundreds of miles by HHT through mountainous terrain. According to the Nevada Department of Transportation (NDOT), Nevada has permitted only two comparable HHT movements of any cargo during the past three years, both large mining autoclaves.

Three of the proposed “Heavy-Haul” routes involve an intermodal transfer station near Caliente, opposite the mouth of Kershaw Canyon and the entrance to Kershaw-Ryan State Park. A fourth alternative “Heavy-Haul” route involves an intermodal transfer station near the exit off I-15 to Valley of Fire State Park.

An intermodal transfer station is designed to facilitate the transfer of nuclear waste and spent nuclear fuel from rail cars to heavy-haul transport trucks. Consisting of approximately 50 acres, the transfer station will include “rail tracks, two shipping cask transfer cranes (one on a gantry rail and a backup rubber-tired vehicle), an office building and a maintenance and security building. It would also have connecting tracks to an existing mainline railroad and storage and transfer trucks inside the station boundary. The maintenance building would provide space for routine service and minor repairs to the heavy-haul trailers and tractors. The station would have power, water, and other services. Diesel generators would provide a backup electric power source. The station would have the capacity to allow an intermodal transfer rate of 22 rail casks per week (11 loaded casks to the repository, 11 empty casks returned to the commercial and DOE sites).”

Section 6.3.3.2 fails to address aesthetic impacts. This section ignores potential impacts of other categories, especially noise, on Kershaw-Ryan State Park and fails to evaluate possible impacts to Valley of Fire State Park or its visitors as a result of the Apex/Dry Lake intermodal transfer station proposed location. Accordingly, Sections 6.3.3.2.1 through 6.3.3.2.3, as well as 6.3.3.2.5, are deficient.

Page 6-86; Section 6.3.3.1 - Impacts Common to Nevada Heavy-Haul Truck Implementing Alternative

The Draft EIS discussion of HHT operations is deficient. Preliminary analysis by NDOT suggests that the total length of an HHT convoy including escort vehicles will be about 350 feet, and escorts will also be required for return shipments. On any given day of operations, there could be two to four HHTs traveling both ways along any route. No evidence is offered to support the 20 to 30 miles per hour average speed assumption. If actual average speeds are 10 to 15 miles per hour, traffic impacts would be exacerbated and overnight parking areas could be required on all identified routes. Even at 20 to 30 miles per hour, the Draft EIS has severely underestimated the adverse impact on normal traffic flows along HHT routes, considering convoy length and frequency. No evidence is offered on HHT turning radius requirements, which may necessitate shutting down certain intersections and road segments to allow HHT passage. There is no discussion of HHT in-transit refueling requirements and no meaningful discussion of the safety, security, and perceived risk aspects of HHT overnight parking.

The Draft EIS generally fails to identify and evaluate credible HHT routing options. Nevada acknowledges that DOE has accurately classified the Caliente-Chalk River HHT route as a “non-preferred alternative” in response to national security issues raised by the Air Force. (p. 6-110) Since concurrence by the Secretary of the Air Force would be required, DOE should eliminate this route from further consideration. DOE’s other HHT route options are unrealistic and unwise. The Draft EIS continues to consider HHT routes using I-15, the Las Vegas Beltway, and U.S. 95 through Las Vegas, in spite of repeated advice from Clark County and state agencies that these routes are not even acceptable for LWT shipments. In 1994, NDOT notified the California Highway Patrol that: “Because I-15 goes through the heart of Las Vegas, Nevada is interested in selecting a preferred route ... bypassing Las Vegas.” Absent action by California to designate SR 127 or other routes avoiding I-15 into Las Vegas, NDOT stated its intention to “recommend to the State Transportation Board the designation of Nevada SR-160 as the preferred route and to un-designate I-15 between the Utah-Nevada Stateliner and Las Vegas as a preferred route.” DOE should eliminate HHT routes through Las Vegas from further consideration.

The HHT routes identified in the Draft EIS do not meet NRC safeguards criteria. A curious deficiency in the Draft EIS HHT routing analysis is DOE’s apparent ignorance of the NRC safeguards route approval process and criteria. Advance route approvals are part of a safeguards system designed to “[m]inimize the possibilities for radiological sabotage of spent fuel shipments, especially within heavily populated areas...” [10CFR 73.37(a)(1)(i)] In 1980, NRC issued a regulatory guidance document (NUREG-0561,

Rev. 1) which identified five types of route characteristics that receive special consideration when Commission staff review requests for route approval: (1) routes through highly populated areas; (2) routes which would place the shipment or the escort vehicle in a significantly tactically disadvantageous position (for example, tunnels which would prevent the escort vehicle from maintaining continuous surveillance of the shipment vehicle); (3) routes with marginal safety design features (for example, two-lane routes, absence of guard rails, etc.); (4) routes with limited rest and refueling locations; and (5) routes where responses by local law enforcement agencies, when requested, would not be swift or timely. None of the HHT routes identified in the Draft EIS meet the safeguards routing criteria established by the NRC. NRC has accepted Nevada's petition for rulemaking, which requests a further strengthening of the advance route approval requirements.

The conclusions regarding changes in level-of-service are not supported by any analysis. The extreme length of the heavy-haul vehicle and its slow speed will undoubtedly result in a significant impact to traffic flow on all the highways considered. This is particularly true in the Las Vegas metropolitan area. The EIS does not include any analysis of accident rates for this type of vehicle, or of accident rates for other vehicles caused by the traffic delays created by the heavy-haul vehicle.

Heavy-haul shipments would be dispatched from the intermodal transfer station during early-morning hours (p. 2-53). For the Apex/Dry Lake and the Jean/Sloan routes, this will result in heavy-haul vehicles traversing the Las Vegas urban area during morning rush hour. If the level-of-service for the Las Vegas Beltway during non-rush-hour traffic is Class C or lower, then it is reasonable to assume that the level-of-service during rush hour would be D or F. Putting the heavy-haul vehicle in traffic experiencing this level-of-service is unacceptable.

Page 6-96; Section 6.3.3.1 - Impacts Common to Nevada Heavy-Haul Truck Implementing Alternative

Incident-Free Transportation

The Draft EIS does not adequately evaluate the radiological impacts of routine HHT transportation. The Draft EIS appears to significantly underestimate HHT routine radiation exposures to the general public, especially in Tonopah, Goldfield, Beatty, and other locations where residences and businesses are located within 25 to 200 feet of the U.S. 95 road shoulder. The RADTRAN model is not sufficiently sensitive to local conditions and probable HHT operating characteristics. DOE must recalculate the annual and cumulative collective dose and maximum individual dose, assuming a range of HHT



speeds and stop-times. The analysis must consider the actual location of all occupied buildings within ¼ mile of the route. The analysis must accurately reflect the actual population within ¼ mile of the route during daylight hours on week days, including children in schools and nonresidents in hotels and commercial establishments. Nevada believes that numerous individuals could receive annual doses from HHT operations equal to ten to thirty percent or more of annual background radiation exposures.

## Accidents

The Draft EIS discussion of HHT accidents is deficient. Because of the lack of actual experience with long distance HHT shipments, no meaningful empirical data is available to support the Draft EIS assertion that accident risks “are low for all five [route] alternatives.”(p. 6-96) HHT operations on the routes identified in the Draft EIS may experience substantially higher accident frequencies and consequences. For example, using Nevada average accident rates and projected shipment-miles for DOE’s Module 2 scenario, the expected number of HHT accidents on the Caliente route would be about 24 (12 loaded, 12 empty) over 39 years. The severity and consequences of accidents could be greater because of unique local hazards. Steep upgrades and downgrades (especially in combination with horizontal curves less than 800 feet radius) and critical side slopes and steep drop-offs (common near the summits of mountain passes) could subject casks to extreme accident impact forces and make emergency response, cask recovery, and post-accident cleanup difficult. Such conditions appear to exist near Oak Springs Summit on U.S. 93, near Hancock Summit on SR 375, and at several other locations along the Caliente HHT route.

Page 6-105; Section 6.3..3.2.1 - Caliente Route Implementing Alternative

## Occupational and Public Health and Safety

The Draft EIS does not adequately evaluate the radiological impacts of routine HHT transportation using the Caliente route. The Draft EIS states that HHT shipments could routinely use existing roadways through Tonopah and Goldfield. (pp. 6-100, J-84, and J-88) The State of Nevada challenges this assertion, but if we accept it for purposes of analysis, the Draft EIS appears to significantly underestimate HHT routine radiation exposures to the general public in Tonopah, in Goldfield, and possibly in Beatty. The RADTRAN model, using the assumptions described in the Draft EIS, (pp. J-39 to J-42) is not sufficiently sensitive to local conditions and probable HHT operating characteristics. DOE must recalculate the annual and cumulative collective dose and maximum individual dose, assuming that each HHT shipment stops for 2 -5 minutes at the intersection of U.S. 6 and U.S. 95, and travels through Tonopah and Goldfield at an

average speed of 5 miles per hour. Numerous residences and businesses are located within 25 to 250 feet of the U.S. 95 road shoulder. The analysis must consider the actual location of all occupied buildings within ¼ mile of the route. The analysis must accurately reflect the actual population within ¼ mile of the route during daylight hours on week days, including children in schools and nonresidents in hotels and commercial establishments.

#### Socioeconomics

Cost figures shown for upgrading the Caliente route are significant understatements. It is likely that the State of Nevada will require extensive lane additions and widening along most of the route in both directions between Caliente and Yucca Mountain. Without such additions, the presence of daily heavy-haul trucks coming and going along the narrow, rural highways would create hazards and cause major disruption along impacted highways. Costs for upgrading the Caliente route alone are likely to be upwards of \$800 million.

The Draft EIS also fails to assess costs and impacts of upgrading an alternative to the Caliente heavy-haul truck route that can be used when the primary route is unavailable (due to weather, construction, accidents, etc.). To be functional, a heavy-haul transportation system must have at least two functional routes. Both routes will require extensive upgrades and improvements. Costs and impacts for both must be assessed in the EIS.

#### Page 6-137; Section 6.3.4 - Environmental Justice Impacts in Nevada

The Draft EIS fails to acknowledge the full range of nuclear waste transportation impacts on Native American communities, lands, and cultural resources in Nevada.

The State of Nevada considers the following Indian Reservations and Colonies in Nevada to be potentially affected by rail and truck routes identified in the Draft EIS:

- Moapa Reservation (UPRR, I-15)
- Las Vegas Reservation (Valley Rail Spur, US95)
- Ely Colony (US93)
- Duckwater Reservation (US6)

- Walker River Reservation (UPRR)
- Pyramid Lake Reservation (UPRR)
- Reno-Sparks Colony (UPRR)
- Lovelock Colony (UPRR)
- Winnemucca Colony (UPRR)
- Te-Moak Reservations [Battle Mountain, Elko, South Fork, Te-Moak, Wells]  
(Carlin Rail Spur, UPRR)

The Draft EIS does not define transportation-affected and potentially-affected Indian lands and resources. Nevada defines affected lands and resources to included the following: (1) reservations crossed by potential shipping routes; (2) off-reservation ceded lands, where Tribes retain treaty rights or other legally-recognized user rights, crossed by potential shipping routes; (3) reservation lands and off-reservation lands within transportation emergency evacuation zones along potential shipping routes; (4) reservation and off-reservation lands which could be contaminated by air or water transport of radioactive materials released in a severe transportation accident or terrorist incident (generally within 50 miles down-wind, down-stream, or down-gradient of a potential shipping route); (5) reservations whose highway access would be disrupted by a nuclear waste transportation emergency; and (6) off-reservation lands along potential shipping routes where Tribal personnel would likely be involved in transportation emergency response.

The Draft EIS gives insufficient consideration to the major concerns identified by potentially affected Indian Tribes in Nevada, the Western Shoshone National Council, and organizations such as the Nevada Indian Environmental Coalition and the Inter-Tribal Council of Nevada. These concerns include: (1) Tribal authority to regulate shipments across reservations; (2) emergency response planning and training for Tribal personnel; (3) advance notification of shipments and shipment monitoring; (4) protection of Native American religious and cultural sites, plants, and animals, both on and off reservations; (5) cultural implications of potential radiological contamination of Indian lands, and the cultural implications of cleanup activities involving non-tribal personnel; and (6) adverse economic impacts of public perception of risk, especially adverse impacts on tribal tourism and recreation businesses. DOE's proposal to construct a rail spur to Yucca Mountain creates special concerns about right-of-way acquisition implications for Western Shoshone land claims (Ruby Valley Treaty) and about protection of graves,

religious sites, and other cultural resources within the potential rail corridors identified in the Draft EIS. Moreover, DOE failed to provide financial assistance to facilitate independent technical review of the Draft EIS by potentially affected Indian Tribes in Nevada.

## **SECTION 7. ENVIRONMENTAL IMPACTS OF THE NO-ACTION ALTERNATIVE**

Page 7-1; Section 7 - Environmental Impacts of the No-Action Alternative

This section lacks substance because of the large uncertainties and lack of information regarding the No-Action Alternative. Weaknesses of this kind are discussed by Salk and others (1998) and by Westman (1985).

## **SECTION 8. CUMULATIVE IMPACTS**

Page 8-12; Section 8.1.2.2 - Federal Actions - DOE Waste Management Activities

The statement in paragraph 2 of this section regarding potential short and long-term cumulative impacts of waste management activities is not consistent with information in Table 8-1 (page 8-4) that indicates no short-term cumulative impacts from future potential waste management activities.

Page 8-22; Table 8-5 - Summary of cumulative short-term impacts in the proposed Yucca Mountain Repository region.

Utilities: Table 8-5 states that peak electric power demand would require an upgrade of the transmission and distribution system. In order for this EIS to be complete, it should include an evaluation of impacts of a specific proposed upgrade since it is acknowledged that an upgrade would be required as part of the Proposed Action. Section 8.2.11 does not provide an evaluation of the impacts of the necessary upgrade.

Waste Management: There is no existing authority that would permit low-level radioactive waste from the repository operation to be disposed at the NTS low-level waste disposal facility. This assumption is inconsistent with other statements regarding low-level waste disposal in this Draft EIS.

Page 8-31; Section 8.2.2.2.2 - Radiological Air Quality

This section incorrectly states that the 2.5 mrem per year cumulative dose is "about 40 percent" of the 10 mrem annual dose regulatory limit.

Page 8-36; Section 8.2.4 - Biological Resources

This section is deficient in two major respects. First, an ecosystem approach was not adopted for the Draft EIS and second, thermal loading impacts are not factored into cumulative effects. Therefore, this section is inadequate.

Page 8-37; Section 8.2.5 - Cultural Resources

DOE should make provisions for identifying, evaluating, and treating historic properties if Inventory Module 1 or 2 is authorized.

Page 8-39; Section 8.2.7 - Occupational and Public Health and Safety

See comments on Section 4.1.7 above.

Page 8-59; Section 8.3 - Cumulative Long-Term Impacts in the Proposed Yucca Mountain Repository Vicinity

The performance assessment results shown in tables for this section are based on a Total System Performance Assessment (TSPA) code and supporting analyses developed prior to those that will be used in the site suitability evaluation for site recommendation. The Draft EIS must include a description of the current TSPA and include its results and analyses rather than relying on an acknowledged incomplete and obsolete TSPA. In order to meet the need for a complete and accurate evaluation of the long-term impacts of the Proposed Action, DOE should issue a new Draft EIS for public review and comment that includes information and analyses consistent with the Site Recommendation Report.

Page 8-74; Section 8.3.2.1 - Past, Present, and Reasonably Foreseeable Future Actions at the Nevada Test Site - Item Number 5. Shallow Land Radioactive Waste Disposal

There has been no demonstration of the "absence of a groundwater pathway." Section 8.3.2.1.3 does not provide any basis for this assertion.

Pages 8-74 to 8-76; Section 8.3.2.1.1 - Underground Nuclear Testing

The discussion in this section of the Draft EIS addresses cumulative impacts associated with groundwater contamination within the Yucca Mountain region. The discussion covers contamination beneath the Nevada Test Site (NTS).

Between 1951 and 1992, DOE conducted more than 1,000 nuclear tests at the NTS. Nearly one third of these tests were conducted in or near the groundwater. State officials contend that as much as 300 square miles of surface and subsurface area on and off the NTS are contaminated with radionuclides. The Draft EIS states that the estimated radionuclides source term for all subsurface tests was 300 million curies.

This section of the Draft EIS concludes by stating that "... the maximum potential dose from the underground testing inventory is calculated to be 0.2 millirem per year ... ." The document further states that the maximum cumulative impact of the Proposed Action in 10,000 years (i.e., radionuclides released from Yucca Mountain at the proposed point of compliance (20 kilometers from the repository) would be 0.22 millirem per year. Adding this to the NTS release of 0.2 millirem per year produces a cumulative release of 0.42 millirem per year.

The State of Nevada believes it is not yet possible, with any reasonable level of confidence, to estimate the release of radionuclides through the groundwater to the biosphere in the region of influence beneath the NTS and offsite locations. In fact, DOE does not have the data required to calculate a base case scenario for determining groundwater travel time in the region, let alone to make an estimate of hydraulic conductivity (important for determining the rate of movement of contaminants in the groundwater). The State of Nevada has repeatedly documented these facts as part of the State's ongoing regulatory review of DOE's Underground Test Area program for the NTS. The State's detailed comments are available on the World Wide Web at the following addresses:

**<http://www.state.nv.us/ndep/boff/ndep13.htm>**

**<http://www.state.nv.us/ndep/boff/ndep11.htm>**

It should also be noted that DOE's current program for assessing groundwater contamination beneath the NTS was recently criticized by an independent external peer review group commissioned by DOE. Overall, the reviewers found inadequate data to support groundwater flow modeling at NTS. They noted that available groundwater level and permeability data were inadequate for the assessment of groundwater flow directions, rates, and travel times in the vicinity of the contaminated areas.<sup>35</sup>

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<sup>35</sup> "External Peer Review Group Report on Frenchman Flat Data Analysis and Modeling Task, Underground Test Area Project," (ITLV/13052-077A0), prepared for U.S. Department of Energy, Nevada Operations Office under contract No DE-ACO 8-97NV13052 (September, 1999).

Despite assumptions presented in the Draft EIS, any attempt by DOE to present a “bounding-analysis” of potential cumulative groundwater contamination caused by nuclear testing at the NTS is simply not possible. Moreover, estimates of hydraulic conductivity contained in the Draft EIS rely on only one data set obtained from only one well in a period of fifty years. Using this limited information and then extrapolating the data over a 10,000 year period to produce the estimated 0.2 millirem per year dose figure is pure fiction.

Current estimates suggest the geographic scope of existing groundwater contamination in the region may exceed 300 square miles and extend to depths ranging from 500 to 5,000 feet.

Developing believable and reasonable estimates of the potential cumulative impacts to groundwater from existing contamination beneath the NTS and future contamination that would escape from a proposed repository at Yucca Mountain is mandatory for assessing the degree to which the Proposed Action would affect public health and safety. The Draft EIS fails to make this basic, rudimentary assessment and is, therefore, deficient. The Draft EIS fails to meet the basic requirement of NEPA as defined by the Council of Environmental Quality implementing regulations, Sec. 1500.1(b).

Groundwater contamination attributable to underground nuclear weapons testing has been found off the NTS on the Nellis Air Force Range. Also, contamination has been detected within the NTS boundaries as far as 0.8 miles from a nuclear test location known to be the source of the contamination.

#### Page 8-77; Section 8.3.2.1.3 - Future Nevada Test Site Low-Level Waste Disposal

Paragraph 3 under this section of the Draft EIS states that “DOE proposes to locate the Mixed Waste Disposal unit, which will be a landfill, on about 0.18 squares kilometers (45 acres) of the Area 5 site, immediately north of the developed Radioactive Waste Management Site landfill area. The design has been completed, the unit has been included in the Resource Conservation and Recovery Act permit application, and the environmental assessment is being updated.”

Virtually all of the information stated above is outdated and incorrect. DOE’s permit application related to the Area 5 site is at least five years out of date. DOE’s current RCRA permit re-application was submitted to the State in October 1999. This re-submittal only requests authorization to use an existing mixed waste trench (pit 3) for disposal of defense low-level mixed waste generated on NTS.

Page 8-89; Section 8.4.2.4 - Biological Resources and Soils

The section concerning Nevada transportation impacts appears to address only the intermodal transfer stations and not the routes to be followed through the state. For these reasons, the section is inadequate. Guidance such as that provided by Clark and Cantor (1997) should have been followed to supplement CEQ's 1997, "Considering Cumulative Effects Under the NEPA."

**SECTION 9. MANAGEMENT ACTIONS TO MITIGATE THE POTENTIAL FOR ENVIRONMENTAL IMPACTS**

Page 9-5; Section 9.2.2.2 - Groundwater

The Proposed Action, as spelled out by this Draft EIS, does not meet the stated purpose of a geologic repository. If the "detailed study" of Yucca Mountain by DOE showed a good geologic site, as required by the NWPA, there would be little need for "many engineered barrier elements to complement the site's natural characteristics...." (emphasis added)

Page 9-6; Section 9.2.3 - Biological Resources and Soils

In this section, the focus is almost exclusively on the desert tortoise and not on other components of the ecosystem or on the ecosystem itself. Additionally, there is no consideration of risks associated with mitigation. For these and other reasons (Attachments D, G, M; Clark and Canter, 1997; Ortolano, 1997; Westman, 1985), the section is inadequate.

Page 9-8; Section 9.2.3.2 - General Biological Resources and Soils

This section should include efforts to prevent the spread of noxious or invasive plant species.

Page 9-9; Section 9.2.4 - Cultural Resources

The text of this section states that the Programmatic Agreement (PA) contains the requirements and general procedures for mitigation of adverse effects at important archaeological and historic sites in the Yucca Mountain region. This is incorrect; the PA deals strictly with identification, evaluation, and treatment of historic properties in advance of site characterization activities.



Page 9-18; Section 9.3.3.2 - Groundwater

The Draft EIS does not discuss potential impacts to groundwater from an accident occurring during transport.

Page 9-19; Section 9.3.4 - Biological Resources and Soils

See comment for Page 9-6.

**SECTION 10. UNAVOIDABLE ADVERSE IMPACTS; SHORT-TERM USES AND LONG-TERM PRODUCTIVITY; AND IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES**

Page 10-2; Section 10.1.1.3 - Hydrology

This section of the Draft EIS should point out that the resultant peak doses expected from releases of radionuclides to the groundwater are much larger than considered acceptable under any reasonable standard. To illustrate the extent of expected contamination, reference should be made to Table 8-41 on page 8-63, which provides peak dose calculations at various distances from the waste emplacement area. It must also be recognized that the Proposed Action results in an irreversible commitment of groundwater in Amargosa Valley, Franklin Lake Playa, and springs in Death Valley to contamination by radionuclides at a level that makes the water unfit for human use and a significant danger to the environment.

Page 10-3; Section 10.1.1.4 - Biological Resources and Soils

This section addresses biological and soil resources for Yucca Mountain. No meaningful or substantive information is given and addressed, so the short section is meaningless.

Page 10-4; Section 10.1.1.5 - Cultural Resources

Provisions to deal with unavoidable adverse impacts need to be part of any new Programmatic Agreement drafted by DOE.

Page 10-6; Section 10.1.2.1 - Land Use

The Draft EIS assumes that 0.04 square kilometers could be needed to construct a bypass near Beatty. The Draft EIS ignores the fact that at least two other locations will also require bypasses - Tonopah and Goldfield.

Page 10-6; Section 10.1.2.4 - Cultural Resources

Provisions to deal with unavoidable adverse impacts need to be part of any new Programmatic Agreement drafted by DOE.

Page 10-9; Section 10.2.1.2 - Hydrology

The last statement in this section is specious, at best. Yucca Mountain will result in contamination of a large aquifer and surface water expressions, and the shipping campaign could cause the contamination of many major and minor water bodies throughout the U.S. The perception given by this statement is that it is acceptable to contaminate water in Nevada, but not anywhere else.

## **SECTION 11. STATUTORY AND OTHER APPLICABLE REGULATIONS**

Page 11-1; Section 11 - Statutory and Other Applicable Requirements

This section describes the Department of Energy Orders and Potentially Applicable Federal Regulations. However, there is only a cursory effort at discussing applicable State of Nevada Regulations. This section should be expanded to discuss these regulations in more detail, especially those dealing with the operations of a repository.

The Draft EIS also fails to identify the laws that will be violated by the repository. This includes NRS 445A.575, which reads as follows:

*“It is unlawful to discharge any radiological, chemical or biological warfare agent or high-level radioactive waste into any waters of the state.”*

The Proposed Action contained in the Draft EIS indicates that leakage of high-level radioactive wastes to the groundwater of the State will occur. Therefore, when any such waste from the repository reaches the groundwater, DOE will be in violation of State law. This has not been identified in the Draft EIS.

A new Executive Order (Executive Order 13132 - Federalism) has been issued since the preparation of this Draft EIS. This order should be added to this section and fully incorporated, where applicable, into the Draft EIS.

Because the Draft EIS considers transportation, DOE should identify the regulatory requirements for the storage, shipment, and transportation for all States affected by the transportation of nuclear waste.

Page 11-6; Section 11.2.2 - Water Quality

This section fails to discuss requirements under NRS 445A (Water Pollution Control) for the protection of the waters of the State of Nevada as it applies to the long-term operation and life of the repository. The Draft EIS discusses only requirements for support facilities and ignores long-term repository performance.

Page 11-11; Section 11.2.4 - Control of Pollution

The discussion of the Resource Conservation and Recovery Act (RCRA) in this section of the Draft EIS states that DOE does not expect to need a RCRA permit for Yucca Mountain. However, the table in Appendix I (Table I-10) lists elements that are to be part of defense high-level waste stored in the repository. These elements include barium, cadmium, lead, mercury, and selenium. These elements are controlled under RCRA with set regulatory levels. The Draft EIS should indicate how these RCRA-controlled elements are exempt from permit requirements. The Draft EIS should include a discussion of the permitting process that will be used or an in-depth explanation of why a permit would not be required.

Other DOE documents that discuss the composition of high-level nuclear waste show that toxic heavy metals, organic solvents, and hazardous chemicals are usually contained in high-level defense waste. The Draft EIS should show the breakdown between RCRA-controlled high-level waste and non-RCRA-controlled high-level waste. The Draft EIS should also provide an analysis of how these two waste categories will be handled for Yucca Mountain.

The waste stored at Hanford, WA is currently regulated according to RCRA. The proposed BFNL vitrification plant will be RCRA-permitted, and the INEEL vitrification plant will also be permitted. The statement that DOE will not need a RCRA permit for Yucca Mountain is inconsistent with these facts, and the Draft EIS should clarify this statement.

DOE should also be required to comply with the Toxic Substances Control Act, if applicable. There is no discussion in the Draft EIS about DOE waste that is contaminated by such substances as PCBs. Currently, DOE manages approximately 22,000 cubic meters of radioactive PCBs. DOE currently manages about 14,000 cubic meters of radioactive asbestos. The Draft EIS should contain a discussion of whether or not these waste types will be disposed of at Yucca Mountain.

Reference is made to the existing Programmatic Agreement dealing with site characterization activities. DOE states it would prefer to modify the existing document. However, based on changes in the Preservation Act regulations and the widened scope of the project, the Nevada State Historic Preservation Office requests a new document be negotiated.

## **SECTION 12. REFERENCES**

There were twenty-seven important references regarding biological, ecological, and soil resources cited in the Draft EIS. Of these, three were professional publications reflecting work of the State of Nevada. There are other State of Nevada professional publications not included among the references cited in the Draft EIS. Among DOE's twenty-four other references are ten reports issued by TRW regarding environmental information for the Yucca Mountain Project. Of these, four are Environmental Baseline Files that draw upon additional sources of information. A key DOE citation in the Draft EIS is "TRW 1999k, Environmental Baseline File for Biological Resources." Section 4 (Opposing Views) and Section 5 (Major Issues and Data Needs) of TRW 1999k are attached to these comments. Section 4 identifies six opposing views to DOE's field studies raised by the State of Nevada and the NWTRB. These are key issues regarding Yucca Mountain biological and ecological programs, which are not disputed in the Draft EIS. This is consistent with the earlier comment on the Draft EIS for page 3-59 that DOE failed to use an integrated ecosystem approach, thereby negating many of its field studies for the biological and ecological resource aspects of the Draft EIS. As noted in the comments on Section 1.5 of the Draft EIS, there are many publications concerning EIA and NEPA processes that should have been used as guidance by the DOE, cited, and referenced in the Draft EIS.

## **APPENDIX H. POTENTIAL REPOSITORY ACCIDENT SCENARIOS: ANALYTICAL METHODS AND RESULTS**

In the Draft EIS, DOE analyzes the likelihood and consequences of potential air crashes at the repository. The formula used to estimate crash frequency is standard. Primary factors that must be taken into account is the crash rate for small aircraft (F-15, F-16) and the effective area of the target. The crash rate for small aircraft (page H-11) is provided by the Air Force and is standard; it is the long-term crash rate rather than the crash rate from the last 5 or 10 years.

The effective target area is greatly underestimated. It assumes a major accident would only affect the roof of the waste handling building, since the walls of the waste handling building are five feet thick. The analysis also assumes a jet engine will not penetrate a shipping cask. This is discussed further in Appendix K. Thus, the rail yard is not considered an area that is subject to radiological consequences. Conclusions regarding the consequences of a jet crash into a rail cask are based on assumptions about the air speed of an F-15 and the cross-section of a jet engine. The penetration depth is inversely proportional to the diameter of the penetrating object.

If the object impacting the facility is not a jet engine but a hanging bomb, this assertion by DOE can be disputed. Since Nellis is a bombing range, one must consider hanging bombs, either armed or dummy. Dummies weigh one ton, are made of concrete, and are conical-shaped. They could easily penetrate a cask at speeds of 500 fps. For example, inert bombs were used in Iraq to penetrate fortified bunkers, without “collateral damage.” In addition, we do not know whether Cruise missiles are flown at Nellis. For these reasons, the entire waste handling building and repository freight yard, which would have a large number of shipping casks awaiting processing, must be included in the effective target area,  $A_{\text{eff}}$ . This dramatically alters the likelihood of an air crash accident.

According to DOE, the effective roof area of the waste handling building is 27,000 m<sup>2</sup>, whereas the rail yard plus waste handling building is 0.6 km<sup>2</sup>. (Fig. 2-11) Just considering the footprint, the probability of an air crash increases by a factor of 22, from  $5.6 \times 10^{-8}/\text{y}$  to  $1.2 \times 10^{-6}/\text{y}$ . If one expands the effective area to include the skid zone and the height of horizontal casks on rail cars, the effective area and probability would increase further. Since the probability is greater than  $10^{-6}$ , under DOE regulations, the rail yard must be redesigned to bring the probability down to  $10^{-6}/\text{yr}$ .

#### *Potential source terms*

The EIS considers a “typical” Pressurized Water Reactor (PWR) assembly as one that has cooled for 25.9 years. (page H-17) The State believes this could be an underestimate. However, even if one accepts this average age of 25.9 years, it is quite likely that fuels cooled both less than and more than 25 years would be transported to the proposed repository. Therefore, the accident consequences would be greater than estimated by DOE simply because radionuclides decay exponentially. Co-60, one of the bad actors, since it is located on the outside of fuel cladding, has a half-life of 5.25 years and decays exponentially. The EIS states that the **average** age of shipped fuel is used for estimates of Co-60 crud. (page H-19)

Consider the following scenario. PFS, a proposed private nuclear waste storage facility in Utah, operates until the repository begins operation (supposedly the year 2010) with much of the older spent fuel in the U.S. being shipped first to PFS or being stored at reactor sites in storage casks. For reactors still operating in the year 2010, it is likely that more recent spent fuel would be shipped directly to the repository. The entire cost of loading and shipping this fresher fuel would be borne by DOE, whereas for fuel already stored in casks, costs are already sunk and the incremental cost to the utility is small. Thus, contrary to DOE's view that oldest fuel will be shipped first, it is more likely that older fuel would first be shipped to PFS and newer fuel would be shipped first to the proposed repository, followed at a later time by very old spent fuel. In the end, the average age of fuel shipped might be 25.9 years, but in terms of accident impacts, one cannot take the average age of fuel, since it is not a linear, but exponential, decay.

As an example of the inherent error in considering only the characteristics of an "average age" fuel shipment, consider a dichotomous distribution of fuel ages, with  $\frac{1}{2}$  of the spent fuel being shipped after cooling for five years (the minimum cooling time required by law) and the other half being shipped after cooling for forty-seven years (perhaps cooling at the PFS facility while the newer fuel is shipped to the geologic repository). The average age of the spent fuel shipments is twenty-six years. If we assume there were two curies of Co-60 initially in the spent fuel, we obtain the following estimates for activity using: (1) only the average age of the fuel shipments (26 years); and (2) five years of decay for one curie of Co-60 and forty-seven years of decay for 1 curie of Co-60.

(1): half-life = 5.25 years

decay coefficient =  $\ln(2)/5.25 = .13203 \text{ years}^{-1}$

**$[\text{Co-60}]_{t=26 \text{ years}} = (2 \text{ Curies})e^{-.13203 \times 26} = .065 \text{ Curies}$**

(2):  $[\text{Co-60}] = [\text{Co-60}]_{t=5 \text{ years}} + [\text{Co-60}]_{t=47 \text{ years}}$

$[\text{Co-60}]_{t=5 \text{ years}} = (1 \text{ Curie})e^{-.13203 \times 5} = .517 \text{ Curies}$

$[\text{Co-60}]_{t=47 \text{ years}} = (1 \text{ Curie})e^{-.13203 \times 47} = .002 \text{ Curies}$

**$[\text{Co-60}] = .517 + .002 = .519 \text{ Curies}$**

This simple calculation shows that using only the "average" fuel characteristics results in a gross underestimate of the impact of this short-lived radionuclide. Under the scenario involving PFS operation, waste characteristics will likely conform more to the dichotomous distribution used above than to a normal distribution. This leads to underestimates of the impacts of releases from these containers.

## **APPENDIX I. ENVIRONMENTAL CONSEQUENCES OF LONG-TERM REPOSITORY PERFORMANCE**

Page I-31; Section I.4.2.4 - Hydrology and Climate Regime

The accumulation of greenhouse gases is anticipated to alter not just global climate, but regional climates as well. It is not clear in this section whether state of the science technology (regarding climate change) was used to predict future climate and hydrologic conditions for the performance assessment modeling.

### ***Additional Radionuclides Should Be Included in Dose Assessment***

In order to reduce the time to calculate environmental consequences of long-term repository performance, DOE reduced the full complement of radionuclides down to a manageable number. Specific radionuclides were selected for the dose assessment. The inventory of remaining radionuclides was increased to account for neglecting many radionuclides that are important to a dose assessment.

The radionuclides selected for dose assessment are: carbon-14, technetium-99 and iodine-129 (may be in gas phase and subsequently dissolved in water); selenium-79, protactinium-231, uranium-234 and neptunium-237; plutonium-239 and plutonium-242. (page I-7) Curium isotopes were not included because they were similar to plutonium. Americium isotopes were not directly included – Am-243 was included with Pu-239 and Am-241 was included with Np-237. Pu-240 was not included because it is highly sorbing (but could move more rapidly in colloidal form). U-238 was not included, but its decay product, U-234, was included. Ra-226, with a relatively short half-life (if 1600 years can be considered “short”) also was not included.

The estimated activities of Np-237 and U-234 were increased by 58 % and 13%, respectively. (p. I-8) Np-237 activity included Cf-249, Cm-245, Pu-241, and Am-241. U-234 activity included Cf-250, Cm-246, Pu-242, Am-242, Cm-242, U-238, and Pu-238.

DOE took the following as Ci/waste package for commercial spent fuel (page I-9):

Radionuclide	Curies/waste package
C-14	12
I-129	0.29
Np-237	11
Pa-231	5.1
Pu-239	3,100
Pu-242	17
Se-79	3.7
Tc-99	120
U-234	21

For the period around 10,000 years and earlier, DOE's substitutions underestimate the health impacts concerning long-term repository performance, resulting in a non-conservative estimation of impacts.

To understand the potential ingestion hazard posed by radionuclides in spent fuel, we constructed Table 1 (below). For selected radionuclides, the table lists the number of curies in a PWR fuel assembly for the present, 1,000 years from now, and 10,000 years from now. The table also contains columns for dose conversion factors for effective dose equivalents (EDE) and thyroid. The hazard index is defined as the product of the radioactive inventory and the dose conversion factor. This is a rough measure of the ingestion hazard. The hazard index does not account for transport of specific radionuclides through the environment, which is an important consideration.

The greatest potential hazard through the first 1,000 years arises from Am-241 and Am-243 (see Table 1 below). Through the year 10,000, the greatest hazard arises from Am-243 and Pu-239. Neither Am-241 nor Am-243 are represented in the DOE calculations (page I-9).

Table 2 (below) compares the radioactivity in one canister of spent PWR fuel with the inventory actually employed by DOE. As seen, except for Pa-231, the DOE inventory is always less than that for PWR fuel. Since the DOE analysis also includes lower burnup BWR fuel, it is not surprising to have a lower inventory in the DOE canister. However, note that the radionuclides Am-241, Cf-249, Cm-245, and Pu-241 are not simply added to the Np-237 inventory. DOE has assumed these other radionuclides are added to Np-237 at some future time period, closer to the 10,000-year time frame when computer analysis shows that canisters open up and radioactive leachate moves out of the proposed repository and into the accessible environment. Clearly, if the DOE estimates on package degradation are in error and waste materials move into the aquifer and the accessible environment within a time period less than 10,000 years, then the impact of these neglected radionuclides must be included in order to provide a realistic assessment of consequences. Possible causes of more rapid container degradation may include



construction defects, container damage during emplacement, and chemical interactions. Several surprises have already occurred during dry storage, including chemical interactions with zinc coating leading to the production of hydrogen gas in the VSC-24 cask, causing explosion hazards and QA problems. The effect on cladding integrity for extended storage at high temperatures is untested. Over a 10,000-year period, additional surprises should be expected. Inclusion of Am-241 and Am-243, among other radionuclides, would yield a more realistic dose assessment.

[TABLE 1](#)

Click to View

**TABLE 2**

Click to View

***Multi-Barrier Concept***

Contrary to how a permanent geologic repository is intended to perform under the Nuclear Waste Policy Act, the geological formation is not proposed as the primary containment barrier at Yucca Mountain. Instead, the packaging, consisting of the fuel matrix itself, the fuel rod cladding, and the double wall package must function as the primary containment barrier. Once radionuclides move from the fuel matrix and the waste package, the Yucca Mountain geologic setting provides little resistance. Under the Proposed Action, the function of the geologic setting at Yucca Mountain to merely to decrease the likelihood of human intrusion.

The waste package design in the Draft EIS (not the design currently used by DOE) consists of an outer wall, 10-cm thick layer of carbon steel (corrosion-allowance material) and an inner 2-cm layer of chromium-molybdenum Alloy-22 (corrosion-resistant material). (p. I-34) The computer software WAPDEG quantifies the range of expected degradation. The major factors are temperature and moisture. WAPDEG evaluates generalized and localized corrosion. Corrosion of carbon steel generally begins when the temperature of water is below the boiling point. (p. I-35)

According to these theoretical models, by 5,000 years, nearly every package has a single corrosion-allowance material breach. (page I-40) By 20,000 to 30,000 years, corrosion-resistant material is also breached. High thermal loads generate the earliest breaches.

Spent fuel dissolution depends critically on temperature, carbonate concentration, and pH.

DOE calculates the dose for a reference person in the Amargosa Valley – an adult, who lives year-round on a farm, grows a garden, and raises livestock. (page I-48)

In addition to food, radiation pathways considered by DOE include incidental ingestion of contaminated soil and groundshine. (page I-49) It is not clear that the radiation pathway, dust resuspension, was considered. DOE conducted a survey to determine food consumption habits in Amargosa Valley. To calculate health effects from radioactive input, DOE used ICRP-30 dose conversion factors. It is important to note that the more recent dose conversion factors from ICRP-60 would have allowed DOE to also calculate the dose to children rather than a reference adult, which would likely have resulted in higher dose calculations. Four locations to estimate doses were considered – 5, 20, 30, and 80 kilometers distant. As calculated, the maximum peak dose would occur well after 10,000 years. For 10,000 years, the highest dose would be at 5 km. (page I-51) The first failure for the intermediate thermal load scenario is 9,000 years after repository closure. (page I-52) For the low thermal load case, the first failure occurs at 27,000 years after repository closure.

DOE has high expectations for the containment potential of the cladding. Not taking credit for the cladding increases the mean dose at 20 km from 0.22 mr/y to 5.4 mr/y at 10,000 years. (page I-54) At 1,000,000 years, the doses can be quite high, 260 mr/y at 20 km with cladding credit, and **3,000 mr/y** without cladding credit. These latter doses are extremely high, far above regulatory limits and entirely unacceptable.

*Note: Because the performance assessment for long-term repository performance used in this DEIS is not the one that will be used in the FEIS to support site recommendation, no further review of Appendix I was undertaken. For this reason alone, the DEIS is insufficient.*

## **APPENDIX J. TRANSPORTATION**

### **Page J-23; Section J.1.2.2.1 - Routes Used in the Analysis**

The models used in performing risk analysis rely on obsolete population data. Nevada is the fastest growing area/state in the country. Using population data that are almost a

decade old seriously jeopardizes the study results. These data will be over two decades old if the repository opens in 2010. The population residing within one half mile either side of routes analyzed could easily be twice as much as recorded in 1990. The use of outdated or incomplete data is a problem throughout the Draft EIS.

Page J-89; Table J-37 – Potential Road Upgrades for Caliente Route

The Draft EIS does not properly evaluate a range of costs for required infrastructure upgrades along the Caliente HHT route. Aside from construction of a short bypass in Beatty, the Draft EIS assumes that the Caliente HHT route will require only moderate pavement upgrade turnouts every 20 miles. (p. J-89) Preliminary analysis by NDOT indicates that the life-cycle costs of such upgrades may be \$450-500 million. Additional upgrades may be necessary for safety and traffic control, as well as to reduce routine radiological exposures and perceived risk impacts. The State of Nevada has identified 13 route segments, with a total length of 92 miles, where slow lanes would likely be required on both sides of the road, at a cost of at least \$100 million in addition to pavement upgrades. DOE must reexamine its minimum infrastructure upgrade assumptions and costs. A bounding analysis should estimate the cost of constructing slow traffic lanes on both sides of the road for the entire 331 mile route. DOE should also investigate the costs and benefits of constructing bypasses to avoid the U.S. 6 intersection with U.S. 95 in Tonopah and the extreme right turn on U.S. 95 in Goldfield.

Page J-95 to J-98; Section J.3.3.1 – Intermodal Transfer Station Accident Methodology

A major deficiency in the Draft EIS safety analysis involves the consequences of transportation and storage accidents involving military aircraft. The Draft EIS only evaluates aircraft accidents relative to intermodal transfer stations and fails to consider the impacts on facilities and shipping casks of military ordinance and practice bombs used in training missions. The Draft EIS analysis is limited to the penetration capability of jet engines and engine shafts as falling projectiles.(p. J-97) DOE's 1986 Yucca Mountain Environmental Assessment (EA) correctly identified the potential vulnerability of rail and truck shipments to military aircraft accidents. All of the LWT, HHT, and rail routes identified in the Draft EIS are potentially vulnerable to military aircraft using the Nellis Air Force Base and Bombing Ranges. The Draft EIS must specifically evaluate the consequences of aircraft accidents involving military ordinance designed to destroy tanks and fortified installations. Further, the Draft EIS should also evaluate the potential impacts of military aircraft accidents involving practice weapons, including steel-tipped concrete dummy bombs weighing up to a ton. Even dummy weapons may have a greater destructive capability than the jet engine projectiles evaluated in the Draft EIS.

## APPENDIX K. LONG-TERM RADIOLOGICAL IMPACT ANALYSIS FOR THE NO-ACTION ALTERNATIVE

Two No-Action Alternatives are considered by DOE, both involving long-term storage at present locations: (1) Long-term storage at present locations with effective institutional control for at least 10,000 years; and (2) Long-term storage at present locations with no effective institutional control after 100 years. Another alternative, perhaps more likely, is storage at a centralized location, such as the proposed PFS facility in Skull Valley, Utah. The environmental impact of this alternative should be seriously investigated by DOE.

While DOE researchers have attempted to construct the impact analysis of the No-Action Alternative in parallel to the analysis conducted for the proposed Yucca Mountain repository, in several respects, researchers have not been successful.

For decentralized storage at reactor sites where spent fuel is presently stored, a major concern over the long-term is the freeze-thaw cycle. As DOE researchers note, freeze-thaw cycles lead to concrete spalling and weakening of the concrete overpacks around spent fuel canisters (page K-4). In addition, storage canisters can degrade due to corrosion caused by acidity and chloride concentration. This can be followed by water infiltration (page K-8). The final barriers to radionuclide release are the fuel cladding and the fuel matrix (page K-9).

According to DOE, degradation appears to begin at about 7,000 to 8,000 years. In year 10,000, less than 1% of the cladding has degraded. This is primarily the stainless steel clad fuel. For zirconium, degradation begins about 10,000 years (page K-11).

Table K-4 lists radionuclides important to dose for this decentralized storage scenario: Am-241, Am-243, Np-237, Pu-238, Pu-239, Pu-240 and Tc-99. (p. K-14) These radionuclides are important, but they are not the radionuclides considered in the repository analysis. Of these, only Np-237 is directly considered in the repository analysis. Pu-239 (49%) and Pu-240 (47%) contribute most of the dose, followed by Am-241 (3.2%).

DOE assumed the crash of a mid-size twin engine commercial jet into a dry storage facility. (page K-25) An aircraft could crash into the top, or side of canisters, or could strike in front and skid into the canisters. The estimated crash frequency is 3.2 in 1 million. DOE assumed the crash occurred 1000 years after termination of institutional control. DOE also assumed a fire would heat fuel pins to the point of cladding rupture.  $\text{UO}_2$  would oxidize to  $\text{U}_3\text{O}_8$ . The amount of fuel of respirable size was estimated to be

0.12% of the canister inventory. (page K-26) The State agrees that the environmental impact of an aircraft crash should be evaluated. Similarly, an aircraft crash in the rail yard of the proposed repository should also be evaluated. Given the speed and type of payload (i.e., hanging bombs) represented by F-15 and F-16 fighter jets, shipping casks can release their contents. This environmental impact must be seriously considered by DOE.

## **APPENDIX L. FLOODPLAIN/WETLANDS ASSESSMENT**

### **Page L-18; Section L.4.2.1 - Effects along Rail Corridors**

In the Draft EIS, DOE has not adequately studied the potential surface water impacts of either the rail or the heavy-haul alternative. The discussion on wetlands contained in Appendix L for all of the rail alternatives contains the statement, “no field searches or formal delineations of wetlands have been conducted along this route.” Also, wetlands have also not been delineated for the intermodal transfer station sites. Some of the rail corridors are known to cross or be near to significant springs, groups of springs, streams designated as riparian areas, or reservoirs associated with wetlands. Wetlands and riparian areas are a valuable resource in Nevada. Simply stating that impacts will be mitigated is insufficient.

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