DOE/EIS-0250/SA-1

Supplement Analysis

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Prepared by: Office of Civilian Radioactive Waste Management
U.S. Department of Energy
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Purpose

The *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F) (FEIS) analyzed the potential environmental impacts of the construction, operation and monitoring, and eventual closure of a geologic repository. As part of the analysis, the FEIS evaluated the impacts associated with the transport of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) to the Yucca Mountain site from 72 commercial and 5 Department of Energy (DOE) sites across the United States. The transportation analysis evaluated two national transportation mode scenarios, *mostly legal-weight truck* and *mostly rail*, both of which included a combination of legal-weight truck and rail shipments. Under the mostly legal-weight truck scenario, most of the shipments of SNF and HLW to the repository would be made by legal-weight trucks, while most of the shipments under the mostly rail scenario would be made by rail. There were three Nevada transportation mode scenarios, referred to as the legal-weight truck scenario, the rail scenario, and the heavy-haul truck scenario, that were also evaluated in the FEIS.

The FEIS identified the mostly rail scenario as the preferred mode of transportation, both on a national basis and in the State of Nevada. Since there is no rail access from existing rail lines to the Yucca Mountain site, implementation of the mostly rail scenario would require construction of a branch rail line within Nevada to connect existing rail lines to the site. As part of its planning process, DOE has considered how to proceed if a new rail line in Nevada were not completed by the time a repository at Yucca Mountain were licensed by the Nuclear Regulatory Commission (NRC) to begin operation.

This Supplement Analysis examines the potential environmental impacts of shipping legal-weight truck casks on railcars from generator sites to an intermodal transfer station that would be constructed and operated in Nevada, and the subsequent transportation of those casks to a repository at the Yucca Mountain site by legal-weight trucks [hereinafter referred to as the *rail/legal-weight truck cask* (rail/LWT cask) scenario]. The Supplement Analysis then addresses whether the potential environmental impacts associated with the rail/LWT cask scenario are within the range of potential environmental impacts analyzed in the FEIS for the mostly rail scenario.

All of the components of the rail/LWT cask scenario were considered in the FEIS. For purposes of comparison, the components of the rail/LWT cask scenario that were not included in the preferred mostly rail scenario, but which were considered in the FEIS, consist of the following:

- Legal-weight truck casks would be shipped to Nevada by railcars. The mostly rail scenario assumed that the casks arriving in Nevada by rail would be rail casks.
- An intermodal transfer station would be built and operated in Nevada, at one of the three alternative locations considered in the FEIS, *in addition* to the construction of a branch rail line. The mostly rail scenario included the construction in Nevada of either a branch rail line *or* an intermodal transfer facility, with associated highway upgrades for heavy-haul trucks to transport the rail casks to the repository.

- Legal-weight truck casks would be transported from the intermodal transfer station to the repository by the same routes analyzed for the heavy-haul truck shipments under the mostly rail scenario analyzed in the FEIS. The mostly rail scenario assumed that heavy-haul truck shipments would be made from the intermodal transfer station *or* that legal-weight truck shipments would be made using I-15 and U.S.-95, so that the only difference under the rail/LWT cask scenario would be that legal weight truck shipments would be transported along routes previously analyzed for heavy-haul truck shipments.

Background

Under the mostly rail scenario as analyzed in the FEIS, rail casks would be loaded with SNF/HLW at the generator facility, put on a railcar, and transported to Nevada. Within Nevada, the FEIS analyzed two modes of transport for the mostly rail scenario: (1) building a branch rail line to Yucca Mountain from an existing rail line and (2) constructing and operating an intermodal transfer station to transfer the rail casks to a heavy-haul truck and follow existing highways to Yucca Mountain. For the Nevada rail scenario, the FEIS evaluated five rail corridor implementing alternatives. For the Nevada heavy-haul truck scenario, the FEIS evaluated five heavy-haul routes from three possible alternative intermodal transfer station locations.

Analysis

The consideration of the potential environmental impacts of the rail/LWT cask scenario requires a review of each particular component of the scenario, individually and collectively. For analytical purposes, it is assumed that DOE would employ the rail/LWT cask scenario for the first 6 years of the 24-year shipping campaign. Operations for the remaining 18 years would be identical to those presented in the FEIS under the mostly rail scenario. The first six years of the rail/LWT cask scenario can be broken down into the following specific components or activities:

1. Load legal-weight truck casks at the generator sites,
2. Ship legal-weight truck casks on rail cars to Nevada,
3. Construct and operate an intermodal transfer station at one of three analyzed Nevada locations; and
4. Ship legal-weight truck casks by legal-weight truck from the intermodal transfer station to Yucca Mountain.

The impacts from each of the individual components that make up the rail/LWT cask scenario are discussed individually below.

1. Load Legal-Weight Truck Casks at the Generator Sites

Under the mostly rail scenario, the FEIS analyzed the loading of rail casks at most of the generator facilities (FEIS 6.2.2.1). Six of the generator sites do not have the ability to load rail casks and therefore are limited to legal-weight truck casks only. The potential radiological impacts from loading operations to the involved worker population for the mostly rail scenario are reported in the FEIS as 1.7 latent cancer fatalities (LCFs) over the 24-year period.

Under the mostly legal-weight truck scenario, the FEIS analyzed the loading of legal-weight truck casks at all of the commercial SNF generator facilities (FEIS 6.2.2.1). The potential radiological impacts are reported in the FEIS as 6.1 LCFs over the 24-year period.

For analytical purposes, because of the exclusive use of legal-weight truck casks during the first 6 years of the rail/LWT cask scenario, the potential radiological impacts of loading operations associated with this scenario would fall within the range of the two scenarios reported in the FEIS at approximately 2.8 LCFs[i] over the 24-year period.

2. Ship Legal-Weight Truck Casks on Rail Cars to Nevada

Under the mostly rail scenario, rail casks would be shipped to Nevada on railcars. For those six generator facilities that do not have the capability to handle rail casks, the FEIS analysis assumed that legal-weight truck casks would be shipped by legal-weight truck to the repository. The analysis of the mostly rail scenario assumed one rail cask per railcar and one railcar per shipment. The combination of rail shipments and legal-weight truck shipments would result in a total of 10,700 shipments, 1,100 of which would be legal-weight truck shipments.

As part of a sensitivity study, the FEIS evaluated the potential shipment of legal-weight truck casks on railcars (Appendix J, Section J.2.1). In the analysis, DOE assumed one legal-weight truck cask per railcar and five railcars per train shipment. This assumption would result in 10,600 train shipments. The potential environmental public health impacts of the full-scale implementation of this operational concept were presented in the FEIS in terms of the estimated number of public incident-free latent cancer fatalities and the estimated number of traffic fatalities.

Table 1 presents the incident-free radiological and potential traffic accident impacts for the rail/LWT cask scenario as compared to the mostly rail and mostly legal-weight truck scenarios as reported in the FEIS.

Table 1. Incident-Free Radiological and Traffic Accident Impacts

Category	Rail/LWT Cask[ii]	Mostly Legal-Weight Truck	Mostly Rail
Incident-free radiological impacts to the public (LCFs)	1.6	2.5	0.8
Traffic fatalities	4.3	4.9	3.1
Total	**5.9**	**7.4**	**3.9**

The FEIS states that, while shipping all legal-weight truck casks on railcars would be feasible, it would not be practical. This determination was made based upon financial considerations, as well as the relatively higher estimates of health and safety impacts to the public (Appendix J, J.2.1). As shown in Table 1, the analytical assumptions that define the rail/LWT cask scenario (specifically the shorter period of shipment of legal-weight truck casks on rail cars) would result in public health and safety impacts that would fall between those estimated for the mostly rail and the mostly legal-weight truck scenarios reported in the FEIS.

3. Construct and Operate an Intermodal Transfer Station at One of the Three Analyzed Nevada Locations

Under the mostly rail scenario in Nevada as analyzed in the FEIS, DOE would build either a branch rail line to Yucca Mountain or an intermodal transfer station, upgrade a selected highway, and use heavy-haul trucks to transport the rail casks to the repository. Under the rail/LWT cask scenario, DOE would build an intermodal transfer station in Nevada, as well as build a branch rail line to the repository. Thus, under the rail/LWT cask scenario, the impacts of the construction of an intermodal transfer station would have to be added directly to those of the rail line construction.

Most of the environmental impacts of building an intermodal transfer station or a branch rail line are driven by the amount of land disturbance. Building an intermodal transfer station would disturb approximately 0.2 square kilometers, while building a branch rail line would be expected to disturb between 5.2 and 20.1 square kilometers. DOE has identified Caliente as a preferred rail corridor, and the building of a branch rail line in the Caliente rail corridor would be expected to disturb up to 19.8 square kilometers of land.

Section 6.3.3 of the FEIS describes the potential environmental impacts of Nevada heavy-haul truck transportation implementing alternatives. The evaluation addresses (1) upgrading highways to accommodate heavy-haul truck shipments, (2) constructing and operating an intermodal transfer station, and (3) making heavy-haul truck shipments. The construction and operation of an intermodal transfer station was evaluated at three different locations near existing rail lines and highways: (1) near Caliente, (2) northeast of Las Vegas (Apex/Dry Lake), and (3) southwest of Las Vegas (Sloan/Jean). The rail/LWT cask scenario would include building an intermodal transfer station at one of these locations.

Section 2.1.3.3.3.1 of the FEIS includes a description of the technical and operational aspects of an intermodal transfer station that would be designed to support the entire 24-year shipping campaign. The FEIS assumed that an intermodal transfer station would be used to transfer rail casks from railcars to heavy-haul trucks for transport to the repository. Although the FEIS does not consider use of an intermodal transfer station to transfer legal-weight truck casks to legal-weight trucks, the following engineering assumptions can reasonably be relied upon:

- An intermodal transfer station designed to handle transfers of legal-weight truck casks to legal-weight trucks from a rail siding would be no larger and require no more operational infrastructure than an intermodal transfer station designed to transfer the larger rail casks to a heavy-haul truck. Legal-weight truck casks weigh approximately 25 tons when loaded, while rail casks weigh approximately 150 tons when loaded (Appendix J, J.2).
- Operations of the intermodal transfer station would occur for a period of time shorter than the full 24-year shipping campaign evaluated in the FEIS (analytical assumption – 6 years).

Based on these assumptions, the potential environmental impacts of constructing an intermodal transfer station designed to handle legal-weight truck casks would be no greater than those

presented in the FEIS for construction of an intermodal transfer station designed to handle rail casks and would provide only an incremental increase in potential impacts (approximately one percent of the land disturbance that would result from building a branch rail line in the Caliente corridor) when added to those from construction of the branch rail line. Potential environmental impacts from operating the intermodal transfer station would be less than those presented in the FEIS because the station would be assumed for analytical purposes to operate for only 6 years of the shipping campaign.

4. Ship Legal-Weight Truck Casks by Legal-Weight Truck from the Intermodal Transfer Station to Yucca Mountain

Under the mostly rail scenario, the FEIS evaluated the shipment of rail casks to the repository on either a branch rail line or on heavy-haul trucks from an intermodal transfer station in Nevada. The FEIS estimated the need for approximately 9,600 rail cask shipments under the mostly rail scenario. The FEIS considered the potential impacts for five potential rail corridors, while the heavy-haul truck analyses evaluated five potential heavy-haul truck routes from three alternative locations for an intermodal transfer station. The FEIS estimated that the potential incident-free radiological impacts to members of the public in Nevada from heavy-haul truck transportation would range from 0.03 to 0.15 LCFs, depending on the route, compared to a range of 0.009 to 0.06 LCFs for use of the branch rail. Traffic fatalities using heavy-haul truck were estimated to be between 0.23 and 0.6 fatalities, as compared to 0.05 to 0.09 fatalities for the branch rail.

The FEIS also evaluated, as part of the mostly legal-weight truck scenario, the shipment of 53,000 legal-weight truck shipments of SNF/HLW, primarily using I-15 and U.S.-95 in Nevada. The FEIS estimated the potential incident-free radiological impacts to members of the public in Nevada for the mostly legal-weight truck scenario to be 0.17 LCFs over the 24-year shipping campaign, and estimated 0.49 traffic fatalities would occur during the same period.

If an intermodal transfer station were constructed at one of the three locations analyzed in the FEIS, the legal-weight truck routes to Yucca Mountain would follow one of the heavy-haul routes analyzed in the FEIS. For two of the routes (Sloan/Jean and Apex/Dry Lake), the heavy-haul and legal-weight truck routes from their respective intermodal transfer stations are identical since the intermodal transfer stations would be located adjacent to I-15. For the heavy-haul routes from the Caliente intermodal transfer station, the three analyzed routes are the only available highways to the repository. The Caliente/Chalk Mountain route from the Caliente intermodal transfer station would cross the U.S. Air Force's Nevada Test and Training Range, and thus the route was designated in the FEIS as "non-preferred" on grounds of adverse impacts to national security.

The following observations can be made about the relative environmental impacts of the transportation of legal-weight trucks from a potential intermodal transfer station to the repository:

- As opposed to the implementing alternative employing heavy-haul trucks, the rail/LWT cask scenario would use legal-weight trucks from an intermodal transfer station and therefore no

upgrades or reconstruction of the existing highways would be required, eliminating the attendant environmental impacts as reported in the FEIS.

- The rail/LWT cask scenario would not result in the traffic delays projected by the FEIS for heavy-haul trucks, based on the slow speeds which heavy-haul trucks would be required to maintain.
- Potential environmental impacts from legal-weight truck shipments associated with the rail/LWT cask scenario from either the Sloan/Jean or Apex/Dry Lake intermodal transfer station would be equivalent to those same shipments under the mostly legal-weight truck scenario since both of these locations are near I-15 (and therefore the potential routes to the repository would be the same under either the mostly legal-weight truck scenario or the rail/LWT cask scenario).
- Potential environmental impacts from legal-weight truck shipments associated with the rail/LWT cask scenario from the Caliente intermodal transfer station would depend on the route chosen, but would be less than the mostly legal-weight truck scenario because the legal-weight trucks under the rail/LWT cask scenario would follow the heavy haul routes identified in the FEIS, all of which would effect a smaller population.
- Potential radiological impacts to members of the public in Nevada for the rail/LWT cask scenario would be within the range of impacts presented in the FEIS for the Nevada transportation scenarios (mostly legal weight truck or mostly rail), all of which were determined to be small.

Conclusions

Based on the analysis above, the following conclusions can be drawn:

- Each of the components of the rail/LWT cask scenario has been evaluated as part of the Proposed Action in the FEIS.
- Individually, the potential environmental impacts of each component of the rail/LWT cask scenario are within the range of environmental impacts presented in the FEIS for the mostly rail or mostly legal-weight truck scenarios. It can also be concluded that collectively, the environmental impacts of this scenario as a whole would be within those presented in the FEIS transportation analyses.

Determination:

The Department has determined that the rail/LWT cask scenario would not constitute a substantial change in actions previously analyzed and would not present any new circumstances or information relevant to the environmental concerns and bearing on the previously analyzed actions or impacts, within the meaning of 40 CFR 1502.9(c) and 10 CFR 1021.314. Accordingly, the Department has determined that a supplement to the FEIS is not required.

Signed this 10 day of March, 2004 in Washington, D.C.

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[i] To calculate the potential loading impacts for the rail/LWT cask scenario, DOE added one-fourth (6 years of the 24-year shipping campaign) of the potential impacts from the mostly legal-weight truck scenario plus three-fourths (18 years of the 24-year shipping campaign) of the potential impacts from the mostly rail scenario.

[ii] The incident-free radiological and potential traffic accident impacts for the rail/LWT cask scenario were calculated as a combination of impacts from shipping legal-weight truck casks on railcars and the impacts of the mostly rail scenario. Section J.2.1 of the FEIS presents the impacts of full-scale implementation of shipping legal-weight truck casks on railcars. By taking one-fourth (6 of the 24 years) of this value and adding it to three-fourths (18 of the 24 years) of the mostly rail transportation impacts, DOE determined the potential impacts associated with the rail/LWT cask scenario.