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February 17, 2012

Christine Pineda, Project Manager
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Office of Nuclear Material Safety and Safeguards
Mailstop EBB-2B2
Washington, DC 20555-0001

Re: Draft Report for Comment: Background and Preliminary Assumptions for an Environmental Impact Statement – Long-Term Waste Confidence Update, December 2011

Dear Ms. Pineda:

The State of Nevada Agency for Nuclear Projects respectfully submits the attached comments and supporting documents in response to the Background and Preliminary Assumptions for an Environmental Impact Statement – Long-Term Waste Confidence Update December 2011.

We appreciate the opportunity to comment on this matter.

Sincerely,

Robert J. Halstead
Executive Director

RH/sja
cc Marta Adams, Chief Deputy Attorney General
Affected Units of Local Government and Tribes
Western Interstate Energy Board HLW Committee

State of Nevada
Agency for Nuclear Projects
Comments
On
U.S. Nuclear Regulatory Commission
Draft Report for Comment
Background and Preliminary Assumptions
For an Environmental Impact Statement –
Long-Term Waste Confidence Update (December 2011)

February 17, 2012

Appropriateness of 200-year Span for the Environmental Impact Statement (EIS)

NRC staff "plans to develop the EIS to analyze impacts of storage from approximately the middle of this century for a period of 200 years. …the oldest spent fuel will have been stored for about 100 years by the middle of the century. The staff selected a 200-year span for the EIS because that is approximately when this oldest fuel will approach 300 years in storage. The 300-year period is the timeframe being used by NRC and others in technical analyses to identify spent fuel aging issues." [p.6]

We support the staff decision to adopt a 200-year span for the EIS, and the use of a 300-year timeframe for analyses of spent fuel aging issues. The 200-year span for the EIS is an appropriate bounding period, considering the current programmatic and policy situation. The 300-year period is an appropriate bounding timeframe for technical analyses of stored spent fuel aging issues.

However, we suggest that the EIS also evaluate the radiological and thermal characteristics of spent fuel after 50 years and 100 years of storage. Due to decay of shorter-lived fission products, especially Cs-137 and Sr-90, the thermal output and surface dose rate of spent fuel declines significantly between 50 and 100 years of storage. These are particularly important characteristics of spent fuel for the planning and design of the storage and transportation system. Table 1, from the 1980 Waste Confidence proceeding, illustrates this trend for moderate burn-up fuel, typical of assemblies discharged from U.S. pressurized water reactors (PWRs) during the 1980s.

The annual average burn-up of discharged fuel has steadily increased over past three decades. The EIS should provide data for both moderate and high-burn-up fuel (greater than 50,000 MWDt/MTU for PWR and greater than 40,000 MWDt/MTU for BWR), showing thermal and radiological characteristics for representative assemblies after 50, 100, 200, and 300 years of storage.

Table 1. Thermal and Radiation Characteristics of A Spent Fuel Assembly
(After 33,000 MWDt/MTU burn-up)

Age (yr)	Thermal Power (Watts/assembly)	Activity (curies/assembly)	Surface Dose Rate (rem/hr)
1	4,800	2.5×10^6	234,000
5	930	6.0×10^5	46,800
10	550	4.0×10^5	23,400
50	250	1.0×10^5	8,640
100	130	5.0×10^4	2,150
500	45	2.5×10^3	58
1,000	26	1.7×10^3	9.6
5,000	15	6.0×10^2	2.5
10,000	6.4	4.5×10^2	1.8

Source: DOE-NRC, In the Matter of Proposed Rulemaking on the Storage and Disposal of Nuclear Waste (Waste Confidence Rulemaking) PR-50, 51 (44FR61372) Statement of Position of the United States Department of Energy, DOE/NE-0007 (April 15, 1980) Table II-4, p. II-56.

While Nevada does support the 200-year time span for this EIS, there is ample reason to believe that technology development will determine the actual time frame for any spent fuel storage site, whether regional or centralized or even at reactor. One has only to review the technological advances made in the last 100 years to believe that new advances in the next 50-100 years will play a major role in determining the manner in which spent fuel and high-level waste will be managed. Indeed, the history of geologic disposal as a concept is less than 60 years old, dating from the Princeton Conference in 1955 and the resulting publication by the National Academy of Sciences of The Disposal of Radioactive Waste on Land in 1957. The commercialization of dry storage technology is barely 30 years old. The EIS should make the point that, even though the time frame for this EIS is 200 years, there are strong reasons to believe that new management solutions will evolve before then, and that any interim storage facility will not likely become a de facto repository.

Implications of Extended Storage for Geologic Disposal

The NRC Draft Report for Comment states that the EIS "will include geologic disposal as the end point for all scenarios evaluated. The Waste Confidence EIS will not include an assessment of the impacts of the disposal facility; these impacts will be assessed in an EIS for licensing a disposal facility." [p.9] Nevada agrees that this EIS on extended storage need not assess the impacts of a disposal facility. However, we strongly believe that this EIS must broadly and fully assess the impacts of extended storage on the geologic disposal facility.

The EIS should discuss the advantages and disadvantages of an integrated waste management strategy, based on extended storage, for the design and operation of a geologic repository, relative to transportation, surface facilities, waste package design, thermal loading, and long-term performance, as discussed in the BRC Final Report. Under the alternative scenarios suggested for the EIS, the same analyses should be performed for a system including one or more interim storage facilities, and/or a reprocessing facility.

The EIS should specifically address the following issues:

a. What would be the advantages and disadvantages of extended storage (from 50 years to 300 years) on the design of a repository? How might this affect the selection of a site for a geologic repository?

b. What would be the advantages and disadvantages of extended storage on the design of a repository waste package, considering a variety of dual purpose canister designs?

c. What would be the advantages and disadvantages of extended storage on worker exposures at the reactor sites, storage facility sites, and at a repository site?

d. What would be the advantages and disadvantages of extended storage on the transportation of spent fuel to and from an interim storage site, to and from a repository, and regarding design of the transportation packages?

e. What would be the advantages and disadvantages of extended storage on public exposures from the transportation, storage, and disposal of such spent fuel?

Human Error and Human Factors Management

The NRC Draft Report for Comment makes only one reference to human error: "The EIS will consider different accident causes, such as human error, mechanical failure, and natural events." [p.13] The EIS should fully discuss and evaluate the effect of human factors with respect to system and component design, fabrication, operations, and response to incidents and accidents. Human error should be considered as a safety factor in routine operations, as well as a causal factor or exacerbating factor in accidents. Considering the extended time period being evaluated for dry storage of spent fuel in welded canisters without repackaging, it is especially important to assess the potential implications of human errors in canister loading and closure; assess the need for NRC inspection of canister loading operations at reactors; and assess the need for long-term monitoring of canister performance in dry storage. The EIS should also specifically consider the implications of human errors in loading and closure at reactors or at interim storage facilities, in the event that canisters are accepted for repository emplacement without repackaging.

Use of "Generic sites" and "Composite sites" for Impact Assessment

The NRC Draft Report for Comment proposes that the EIS use "generic sites" and "composite sites" to estimate impacts of extended storage installations and associated transportation. "A single generic, composite site may be based on information about several actual sites: a generic, composite site on a seacoast may be derived from information about two or three actual coastal sites and, possibly, other sites." [p.7] This approach is problematic in two respects: the impact assessment would not be legally sufficient for NEPA purposes, and the findings would have little or no value to affected stakeholders in any future use of the EIS. From the standpoint of stakeholder acceptance, evaluating “composite generic sites” based on actual sites is a recipe for disaster. Members of the public will be looking for any indication that “their” area is under consideration without any notification or expression of interest. The statement on page 14 that the “staff will also consider analyzing impacts from one or more actual sites for comparison…” only exacerbates this perception. This methodology would totally negate the “consent-based” approach recommended in the BRC final report. The EIS should evaluate the basic attributes of a generic facility and identify favorable and unfavorable siting conditions for each type of facility on a generic basis. Any detailed evaluation of site-specific impacts should be left for the required NEPA documents at a future time.

Transportation

The EIS should consider the extensive recommendations regarding spent fuel transportation in the Blue Ribbon Commission (BRC) on America’s Nuclear Future Final Report issued in January 2012. The NRC Draft Report for Comment acknowledges the BRC Draft Report recommendations regarding geologic disposal and interim storage [p.8], but ignores the BRC recommendations regarding transportation. The BRC Final Report contains a new chapter, [Pp.81-87] written after the NRC Draft Report, which contains major new recommendations regarding transportation safety, security, and logistics, and specifically endorses the risk management measures recommended by the National Academies in their 2006 report, Going the Distance?: The Safe Transport of Spent Nuclear Fuel and High-level Radioactive Waste in the United States.

Both the Blue Ribbon Commission and the National Academies urged the NRC to proceed with its previous plans for full-scale physical testing of spent fuel shipping casks. Full scale cask testing is not a requirement for NRC certification. Of the currently licensed shipping casks, none have been tested full-scale. In place of full-scale testing, the NRC relies on scale model testing and computer simulation. The possibility of storage for 200 years or more prior to off-site transportation, and the possibility of multiple shipments between reactors, storage facilities, reprocessing facilities and repositories, underscores the need for full-scale physical testing of shipping containers.

The EIS should consider the full range of spent fuel transportation impacts addressed in the NRC licensing proceeding for Yucca Mountain and the associated NEPA documents. The Draft Report for Comment states that NRC staff “will use, where appropriate, aspects of transportation impact analyses contained in other recent NEPA documents.” [p.10] The Draft Report further states the EIS “will consider transportation accidents previously analyzed in the context of radiation exposure,”[p.12] and “the analysis will seek to provide quantitative information” on “potential impacts of transportation, such as costs and radiation exposure.”[p.16]

The EIS for the Long-Term Storage Waste Confidence Update should evaluate the full range of radiological and non-radiological transportation impacts likely be addressed in any future NRC licensing proceeding for interim storage or geologic disposal facilities. The scoping of transportation impacts should be guided by the decision of the NRC Atomic and Safety Licensing Boards (ASLBs) in the Yucca Mountain licensing proceeding:

> … there can be "no serious dispute" that the NRC's environmental analysis in connection with licensing nuclear facilities should extend to "related offsite construction projects – such as connecting roads and railroad spurs." Likewise, there can be no serious dispute that the NRC's NEPA responsibilities do not end at the boundaries of the proposed repository, but rather extend to the transportation of nuclear waste to the repository. The two are closely interdependent. Without the repository, waste would not be transported to Yucca Mountain. Without transportation of waste to it, construction of the repository would be irrational. Under NEPA, both must be considered. [1]

Based on this determination, the ASLBs admitted 46 NEPA transportation or transportation-related contentions addressing virtually every aspect of repository transportation, including construction and operation of rail access to the proposed repository site.

The EIS for the Long-Term Storage Waste Confidence Update should evaluate the same radiological transportation impacts considered in the Yucca Mountain licensing process. NRC staff reviewed and adopted the DOE Supplemental Environmental Impact Statement (SEIS), including the transportation impact calculations for the mostly rail transportation scenario.[2] The SEIS evaluated transportation radiological impacts in four categories: (1) "incident-free" exposures to members of the public residing near transportation routes, cumulative total up to 2,500 person-rem dose and 1.5 latent cancer fatalities, and in certain special circumstances (for example, 0.016 rem to a person in a traffic jam); [Pp.6-20, 6-21, 8-41] (2) "incident-free" exposures to transportation workers such as escorts, truck drivers, and inspectors, cumulative total up to 13,000 person-rem and 7.6 latent cancer fatalities (by administrative controls, DOE would limit individual doses to 0.5 rem per year; the allowable occupational dose is 5 rem per year); [Pp.6-21, 8-41] (3) release of radioactive material as a result of the maximum reasonably foreseeable transportation accident (probability of about 5 in one million per year), involving a fully engulfing fire, 34 rem dose to the maximally exposed individual, 16,000 person-rem population dose and 9.4 latent cancer fatalities in an urban area, and cleanup-costs of $300,000 to $10 billion; [Pp.6-15, 6-24, G-56] and (4) release of radioactive material following a successful act of sabotage or terrorism, using a high-energy density device, resulting in 27-43 rem dose to the maximally exposed individual, 32,000-47,000 person-rem population dose and 19-28 latent cancer fatalities in an urban area, and cleanup costs similar to a severe transportation accident. [Pp.6-27, CR-467]

T**he EIS should specify its assumptions about NRC regulation of spent fuel shipments to interim storage and geologic disposal facilities.** Under current Federal law, shipments of spent nuclear fuel and high-level radioactive waste to facilities constructed under the Nuclear Waste Policy Act (NWPA) as amended, would not be regulated by NRC, except for use of NRC-certified casks and shipment notification to states, as specifically required by the NWPA. Former NRC Chairman Richard Meserve explained: "If DOE takes custody of the spent fuel at the licensee's site, DOE regulations would control the actual spent fuel shipment. Under such

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[1] NRC, Atomic Safety and Licensing Boards, Memorandum and Order Identifying Participants and Admitted Contentions, Docket N0. 63-001-HLW (May 11, 2009).

[2] NRC, U.S. Nuclear Regulatory Commission Staff's Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain, Pp. 3-13, 3-15, 5-1 (September 5, 2008).

circumstances, the NRC's primary role in transportation of spent fuel to a repository would be certification of the packages used for transport. … However, if NRC licensees are responsible for shipping the spent fuel not only must the transport container be certified by the NRC, but also the shipment must comply with NRC regulations for the physical security of spent fuel in transit (10 CFR Part 73). NRC licensees are subject to inspection for compliance with the NRC's transportation safety and security regulations. The NRC also issues Quality Assurance (QA) program approvals for radioactive material packages that apply to the design, fabrication, use and maintenance of these packages. Activities conducted under an NRC QA program are also subject to NRC inspection."[3]

The EIS should consider future developments in the transportation environment which could affect the safety and security of spent fuel shipments. The NRC Draft Report for comments states that the EIS "will not speculate about changes in the national transportation infrastructure or transportation modes that may occur decades or centuries from now." [p.10] The extended period of the EIS must consider likely changes to the freight transportation environment. Movements of spent nuclear fuel by mid-century will occur in an environment that is much different than today. The average speed of freight rail has changed little since the 19th century. Railroads recognize that the greatest opportunity for improved service lies in increased speeds. Over the course of the next century, average freight rail speeds will increase, with fewer and shorter stops. Additionally, railroads are working to enhance their intermodal connectivity. This is particularly important given the growing number of nuclear power plants not currently serviced by freight rail. Technological changes will also reduce train crew requirements and will result in increased use of remote controlled trains. The coming years will see increased use of these trains for cross-country shipments in addition to their current widespread use in rail yards. The EIS should consider the changes to the accident environment posed by faster shipments, as well as the possibility of a large increase in smaller intermodal shipments.

Terrorism and Sabotage

The NRC Draft Report for Comment states that NRC staff "plans to consider the environmental impacts of terrorism related to storage and transportation at a generic level." [p.13] Nevada generally agrees with the generic study approach suggested and use of the information resources identified, including recent and ongoing NRC rulemaking activities regarding 10 CFR Part 73. Given the long timeframe covered by the EIS, provisions should be made for periodic updating of the terrorism and sabotage analyses to address: (1) advances in the technology of terrorism and counter-terrorism; (2) changes in population density near storage facilities and shipment routes; and (3) changes in understanding and definition of the design basis events and design basis threats.

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[3] R.A. MESERVE, RESPONSES TO QUESTIONS FROM SENATOR DURBIN (Letter dated March 22, 2002) NRC-Durbin-ML021060662.pdf (May 10, 2002).