TESTIMONY OF
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Introduction

Good morning Chairman Barton and Members of the Subcommittee. It is my pleasure to appear before you today to provide you with an update on the Environmental Protection Agency's (EPA) environmental protection standards for the proposed geologic repository at Yucca Mountain, Nevada. I will update you on the status of our final standards and focus on issues of interest to the Subcommittee.

I would like to begin by reviewing EPA's statutory authority for issuing the Yucca Mountain standards and the process that we are following in developing the standards. I also will discuss the National Academy of Science's (NAS) technical recommendations, and some important elements of our proposed standards, including the proposed ground water protection standard for Yucca Mountain. Finally, I will generally address the expected impact of our proposed standards on the cost of the repository.

We believe that, as a matter of policy, the environmental protection standards that EPA ultimately issues should consider four primary principles: good science, cost-effectiveness, equity, and pollution prevention.

Statutory Authority

The Energy Policy Act of 1992 [Pub. Law No. 102-486, 106 Stat. 2776, 42 U.S.C. § 10141 n. (1994)] gives EPA the authority to establish public health and safety standards for Yucca Mountain. This Act states that EPA shall promulgate "public health and safety standards for protection of the public from releases from radioactive materials stored or disposed of in the Yucca Mountain repository" [§ 801(a)(1) of the Energy Policy Act]. The Act further states that EPA's standards "shall be the only such standards applicable to the Yucca Mountain site."

Prior to the enactment of the Energy Policy Act, EPA developed generic radioactive waste disposal regulations that applied to all radioactive waste disposal sites, including Yucca Mountain, which was currently under consideration as the Nation's first geologic repository for commercial nuclear waste. These regulations are found at 40 CFR Part 191 (50 FR 38066, September 19, 1985). These generic disposal regulations were applied to the Waste Isolation Pilot Plant (WIPP) in New Mexico, which EPA certified in 1998, and is currently operating as the Nation's first geologic disposal facility for transuranic radioactive waste produced as a result of our Nation's defense programs.

In 1987, EPA's generic disposal regulations were remanded by the U.S. Court of Appeals for the First Circuit [NRDC v. EPA, 824 F 2d 1258 (1st Cir. 1987)], because, among other things, we had not properly considered ground water protection. Also in 1987, the Nuclear Waste Policy Act was amended (NWPAA, Pub. L. 100-203), selecting Yucca Mountain as the sole site to be characterized for high-level radioactive

waste and spent nuclear fuel disposal. Then, in 1992, the WIPP Land Withdrawal Act (WIPP LWA, Pub L. 102-579) was enacted, which directed EPA to finalize the generic disposal regulations at 40 CFR Part 191 and certify whether WIPP was a suitable site for transuranic waste disposal. The WIPP Land Withdrawal Act also exempted Yucca Mountain from the 40 CFR Part 191 generic radioactive disposal standards.

So, in 1992, with the enactment of the Energy Policy Act, EPA was directed by Congress to set site-specific environmental protection standards for Yucca Mountain. In doing so, EPA was to consider technical recommendations from the National Academy of Sciences (NAS). The NAS issued its Yucca Mountain report in 1995. Between 1995 and 1999, when EPA issued our proposed environmental protection standards for Yucca Mountain, we held technical discussions with the NAS, as well as numerous interagency discussions with DOE, the Nuclear Regulatory Commission (NRC), the Office of Management and Budget, the Office of Science and Technology Policy, and other federal agencies to discuss important technical and policy issues associated with the development of the standards.

Standards Development Process

EPA published its proposed standards in the Federal Register on August 27, 1999 (64 FR 46976). We are working on developing the final rule, and we anticipate promulgating the final rule this Summer. We received extensive comments from DOE and NRC, as well as other government entities, NAS, industrial and environmental advocacy groups,Tribal organizations, scientific associations, and members of the general public. We received approximately 800 public comments from 70 groups or

individuals which we will be responding to in writing at the time we issue our final standards.

We have made every effort to consider all sides of the issues that have come to our attention. This includes meetings with interested parties and discussions within the Administration. A significant amount of this time has been spent addressing scientific issues in coordination with NAS, the Office of Science and Technology Policy, DOE and NRC. EPA has worked diligently with these organizations to resolve the many complex issues. We are currently in the final stages of drafting the final rule and supporting documents for our internal Agency review process. These documents include the preamble and rule, extensive technical background information document, economic impact analysis, and detailed response to comments document. Once these documents have been reviewed within EPA, we will begin the inter-agency review process administered by the Office of Management and Budget, in which DOE and NRC will participate.

We are taking the necessary time to ensure that we prepare standards that are technically sound, legally defensible, can be implemented reasonably, and are protective of public health and safety from potential releases from Yucca Mountain. During the public comment period, and thereafter, EPA staff traveled to local communities to hold public hearings and meetings to discuss the standards, EPA's role with respect to the other agencies' roles, and to answer general questions about the Agency's process for setting the standards. These meetings were held with community and Tribal leaders, as well as with state and county representatives.

National Academy of Science's Recommendations and Comments

The Energy Policy Act required us to contract with the NAS to conduct a study to provide findings and recommendations on reasonable standards for protection of the public health and safety. On August 1, 1995, the NAS released its report ("the NAS Report"), titled *Technical Bases for Yucca Mountain Standards*. Since 1995, EPA has thoroughly studied the NAS report and the public comments received on the report in order to propose the standards for Yucca Mountain. The EPA's proposed Yucca Mountain standards are based on and consistent with the recommendations of the NAS. Where our proposed rule departed from a strict reading of the NAS report, we made a special effort to explain our reasoning.

The development of the proposed rule for Yucca Mountain was guided by the findings and recommendations of the NAS because of the special role Congress gave the NAS and because of the NAS's scientific expertise. We worked very hard to incorporate NAS's comments into our proposed rule; and, in some cases we have used NAS's recommendations to inform our policy decisions. In its comments on our proposed standards for Yucca Mountain, the NAS is supportive of many aspects of our proposed rule and provides recommendations for improvement in areas where we disagree.

Important Aspects of EPA's Environmental Protection Standards

The three main elements proposed in our proposed standards are the individual-protection standard, the ground water protection standard, and the human intrusion standard. Each standard must be met for DOE to be in compliance with our rule.

Provided below are some of the issues on which NAS and others had important comments.

The individual-protection standard focuses on exposures to an individual whose lifestyle is similar to people living today in the Yucca Mountain region, and who obtains drinking water and food from local sources. The ground water protection standard protects important natural resources by focusing on the quality of the aquifer supplying water to downgradient communities. The human intrusion standard focuses on evaluating the ability of the repository to withstand a single intrusion event.

Individual Protection

In its proposal, EPA adopted an annual dose of 15 millirem from all exposure pathways as protective. This is equivalent to the NAS-recommended annual risk range of 1×10^{-6} to 1×10^{-5}, which translates to a dose range of 2 to 20 millirem/year. The annual risk associated with EPA's proposed 15 millirem standard and 4 millirem standard for ground water fall within this range. In its comments on the proposed rule, NAS determined that the individual protection standard proposed by EPA fell within the range of values it suggested. In those comments, the NAS stated that, "EPA appears to recognize that its standard must be written in a way that provides appropriate protection to the individuals who have the highest potential for exposure...while avoiding unrealistic and unnecessarily conservative assumptions for individual exposure."

Human Intrusion

In our proposed rule, EPA followed the NAS recommendations on human intrusion. We did this by including a scenario for inadvertent human intrusion that is

analyzed using similar methods as the undisturbed case (i.e., without intrusion). We were prescriptive in specifying the intrusion event in order to make implementation a more reasonable process for DOE and NRC.

Regulatory Time Frame

We proposed that DOE meet numerical standards for 10,000 years after repository closure. The 10,000-year limitation was set to reduce speculation about the application of a regulation beyond 10,000 years and to be consistent with previous regulation of the WIPP geologic repository. In its report, NAS recommended that the period of compliance should extend to a time when the potential peak risks may occur (this could be several tens of thousands years for Yucca Mountain). NAS determined that there is likely little difference between its recommendation and EPA's proposed standard because although EPA's standard applies for only 10,000 years, EPA also proposed to require DOE to consider the performance of the disposal system at the time of peak dose, whenever that occurs, as part of the environmental review process.

Ground Water Protection

The NAS report concluded that an individual protection standard is sufficient for the protection of public health from radiation releases from the Yucca Mountain repository. The NAS did, however, state that, under the Energy Policy Act, EPA has the authority to set a separate ground water standard as a matter of policy. EPA has proposed the ground water standard as an implementation of policy which we plan to articulate more clearly in the final rule.

Ground Water Protection

Ground water is one of our Nation's most precious resources; more than 50 percent of the U.S. population draws on ground water for its potable water supply. If radionuclides migrate into this valuable resource, there are multiple routes of exposure. In addition to serving as a source of drinking water, ground water may be used for irrigation, stock watering, food preparation, showering, and various industrial processes. Ground water contamination is also of concern to us because of potential adverse impacts upon ecosystems, particularly sensitive or endangered ecosystems. For these reasons, we believe it is a resource that needs special protection. Therefore, we proposed a level of protection of ground water at Yucca Mountain at the same level as the maximum contaminant levels (MCLs) for radionuclides that we established previously under the authority of the Safe Drinking Water Act (SDWA).

As you know, EPA has a long-standing policy of emphasizing the protection of ground water resources in other contexts from all sources of pollution. We developed a formal Agency strategy in 1990. Key elements of our ground water protection and cleanup strategy in other contexts are the overall goals of preventing adverse effects on human health and the environment and protecting the environmental integrity of the Nation's ground water resources. Ground water should be protected to ensure that the Nation's currently used and reasonably expected drinking water supplies do not present adverse health risks and are preserved to present and future generations. It should also be protected to ensure that ground water does not interfere with the attainment of surface-water-quality standards that are necessary to protect the integrity of associated ecosystems.

The pollution prevention approach to protecting ground water resources avoids requiring present or future communities to implement expensive cleanup or treatment procedures. This approach also protects individual ground water users. Moreover, absent the protections in our proposed rule, EPA believes the ground water in aquifers around the repository itself could be subject to expensive cleanup by future generations if releases from the repository contaminate the surrounding ground waters at levels that exceed the drinking water standards. A guiding philosophy in radioactive waste management, as well as waste disposal in general, has been to avoid polluting resources that reasonably could be used in the future rather than imposing cleanup burden on future generations.

Virtually every state has taken steps toward comprehensive ground water protection. Forty-nine states have developed programs to protect current ground water sources of drinking water through the Wellhead Protection Program. Forty-one states have numeric or narrative ground water standards to protect their ground water supplies. As EPA has said in testimony to this Subcommittee before, the people of Nevada should not be exposed to higher risks than the people in any other state in the U.S. EPA believes that ground water in a region growing as rapidly as the Las Vegas metropolitan area should be protected from pollution "up front," rather than becoming polluted, and then forcing the residents to bear the cost of the environmental cleanup afterwards.

An important question that has been raised by some commenters is the need for the separate ground water protection standard, in addition to the all pathways individual protection standard. Our proposed rule contains two standards for disposal of spent

fuel and high-level radioactive waste in the Yucca Mountain repository: a 15 millirem all-pathways individual protection standard, and a 4 millirem ground water protection standard. It is critical to understand the relationship between these two separate, but complementary, standards. We proposed an all-pathways individual protection standard and a separate ground water protection standard because it was our view that it was appropriate to do so in order to comply with our statutory mandate to promulgate "public health and safety standards for protection of the public from releases from radioactive materials stored or disposed of" in the Yucca Mountain repository [§ 801(a)(1) of the Energy Policy Act].

The 15 millirem standard is an all-pathways standard that directly protects individuals who may receive exposure (through any pathway) from radionuclides released from the repository. The 15 millirem all pathways standard is the same standard that we included previously in our generic standards for geologic repositories (40 CFR Part 191). Should any pathways including a ground water pathway prove to be significant, the all-pathways standard serves to limit radiation exposures to affected individuals. However, should the ground water pathway be the most significant source of exposure, then an all pathways standard would allow groundwater concentrations that exceed 4 millirem/year.

The 4 millirem standard is the MCL, promulgated pursuant to the Safe Drinking Water Act, and is used to define the allowable level in drinking water. If ground water that is or could be used for drinking water, among other uses, is a significant pathway, present and future users of the ground water resource would be protected at the level of the current drinking water standard by a ground water standard. By extension, a

ground water standard would provide this protection (albeit indirectly) to the individuals who now live, or who may live in the future, in the vicinity of Yucca Mountain. In its report on the technical bases for Yucca Mountain standards, NAS identified ground water as the pathway likely to lead to the greatest exposure of the public and the environment to releases from the Yucca Mountain repository.

With respect to radioactive waste disposal, we believe the fundamental principle of inter-generational equity is important. We should not knowingly impose burdens on future generations that we ourselves are not willing to assume. Disposal technologies and regulatory requirements are developed with the aim of preventing pollution from disposal operations, rather than assuming that cleanup in the future is an unavoidable cost of disposal operations today. Designing a disposal system, and imposing performance requirements that avoid polluting resources that reasonably could be used in the future, therefore is a more appropriate choice than imposing cleanup burdens on future generations. The approach to ground water protection in our proposed regulation is consistent with our overall approach to ground water protection: it limits the contamination of current and potential sources of drinking water in the vicinity of Yucca Mountain.

In designing our proposed ground water protection standard, EPA offered as much flexibility as possible, while still ensuring adequate environmental protection. For example, to facilitate implementation of the standard, we proposed the concept of a "representative volume" of ground water in which DOE and NRC would project the concentration of radionuclides released from Yucca Mountain for comparison against the MCLs. In addition, we proposed the concept of a "point of compliance" whereby

EPA would establish the area where the concentration of radionuclides would be measured. Our proposed standards offered several options and explained the rationale for each in detail.

Our proposed standard requires that DOE provide a reasonable expectation that, for 10,000 years of undisturbed performance after disposal, releases of radionuclides from the disposal system will not cause the level of radioactivity from combined beta and photon emitting radionuclides in the representative volume at the point of compliance to exceed 4 millirem per year to the whole body or to any organ. Put simply, under our proposal, DOE must provide a reasonable expectation that the Yucca Mountain disposal system will meet the same levels as the current MCLs for radionuclides under the Safe Drinking Water Act (42 U.S.C. §§ 300f to 300j-26). We frequently require compliance with the MCLs in our regulations.

When we developed the current MCLs in 1975, we based them on the best scientific knowledge regarding the relationship between radiation exposure and risk that existed at that time. In the near future, we intend to update the existing MCLs based on a number of factors, including the current understanding of the risk of developing a fatal cancer from exposure to radiation; pertinent risk management factors (such as information about treatment technologies and analytical methods); and applicable statutory requirements. Particularly relevant statutory requirements, in this context, are the requirements (1) that MCLs be set as close as feasible to the Maximum Contaminant Level Goal (MCLG) [42 U.S.C. § 300g-1(b)(4)(B)] and (2) that revised drinking water regulations provide for equivalent or greater human health protection than the regulations they replace [42 U.S.C. § 300g-1(b)(9)].

Our preliminary analysis of the current MCLs, which are being revised under a separate Agency rulemaking, indicates that, when updated for the latest scientific understanding, the radionuclide concentrations to meet the current MCLs mostly fall within the Agency's range of acceptable risks of 10^{-4} to 10^{-6}. This means that there will be no more than one in 10,000 to one in 1,000,000 chance of excess cancer deaths. This is not unique to Yucca Mountain, as it is the risk range that has governed the Nation's drinking water regulations for the last 25 years. Based on the statutory requirements and the factors identified above, we proposed allowable concentrations for the radionuclides of concern at Yucca Mountain at levels that are comparable to current standards.

Effects of Our Rule on the Repository's Costs and DOE's Schedule

An EPA draft study (which will be available when the final rule is issued) indicates that EPA's proposed standards will not have a significant impact on the cost of the repository. We support DOE's efforts to design the repository in such a way as to prevent or to the extent possible limit any releases from the repository in order to avoid passing on the costs of clean up to future generations. We understand that DOE still has to undergo the NRC licensing process; however, to date, DOE's ongoing studies show compliance with the proposed ground water standard, although EPA is still considering options and alternatives for the final rule.

As our economic impact analysis for our final standards will illustrate, DOE's costs for the facility are driven by many external influences, including EPA's proposed standards, the recommendations of the Nuclear Waste Technical Review Board and the rigorous NRC licensing process, all striving to enhance repository safety. A primary

concern relates to minimizing the technical uncertainties of modeling and enhancing repository performance through certain engineered enhancements to the repository design (e.g., an improved canister, drip shields).

Conclusion

Thank you again for inviting me to testify before the Subcommittee today. I would be happy to answer any questions that you may have.