STATEMENT OF ROBERT LOUX, EXECUTIVE DIRECTOR, NEVADA AGENCY FOR NUCLEAR PROJECTS, OFFICE OF THE GOVERNOR

BEFORE THE

UNITED STATES SENATE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

MARCH 2, 2006

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Thank you for the opportunity to appear before you today. I am Robert Loux, Executive Director of the Nevada Agency for Nuclear Projects, which is a branch of the Office of the Governor of the State of Nevada. The Agency was created by the Nevada Legislature in 1985 to carry out the States oversight duties under the Nuclear Waste Policy Act. I have served as the Agency director since it was established. Our Agency also serves as staff for the Nevada Commission on Nuclear Projects.

Our state, being the home of the Nevada Test Site, has a long history of federal nuclear programs, and our citizens are well informed about the proposed Yucca Mountain high-level nuclear waste repository located on and adjacent to the southwest portion of the Nevada Test Site, about 90 miles northwest of Las Vegas. The U.S. Department of Energy has occupied the Yucca Mountain site since 1978, and in 1983, after passage of the Nuclear Waste Policy Act of 1982, the site was named one of nine Potentially Acceptable Sites, located in six states. In 1986, after screening of the nine sites as required by the Act, Yucca Mountain was named as one of three Candidate Repository Sites slated for detailed site characterization. The two other sites were located in Deaf Smith

County, Texas, and on the DOE's Hanford Reservation, in Washington. According to the Act, after completion of site characterization, one of the three Candidate Sites would be recommended to the President by the Secretary of Energy for development of a repository.

As you know, in late 1987, Congress passed the Nuclear Waste Policy Amendments Act that terminated the site screening process under which the three candidate sites were being characterized, and singled out the Yucca Mountain site as the only site to be studied for a potential repository. The Amendments Act also terminated the required screening process for a second repository that involved potential sites in states in the northern mid-west and along the eastern seaboard in order to meet the geographic equity provision of the 1982 Act. The Amendments Act directs Congress to consider the need for a second repository between 2007 and 2010.

In order to assure the safety of a repository, the Nuclear Waste Policy Act of 1982 required the Environmental Protection Agency to "promulgate generally applicable standards for protection of the general environment from offsite releases from radioactive material in repositories." Sec 121(a). The Nuclear Regulatory Commission also was instructed to promulgate "technical requirements and criteria" for its use in approving or disapproving a repository license application that "shall not be inconsistent with any comparable standards promulgated by [EPA]" Sec. 121(b). The histories of the original EPA standard

and NRC licensing rule are a matter of record, and others in this hearing likely will make reference to them.

At the time of passage of the Nuclear Waste Policy Amendments Act, in 1987, it was clear that there was no scientific basis for selection of the Yucca Mountain site as the single site to be studied for potential development of a repository, notwithstanding assurances to the Senate Energy and Natural Resources Committee by the then DOE Yucca Mountain Project Manager that it was “inconceivable” to him that the site could not meet the EPA standard by a margin of multiple orders of magnitude. By 1992 it was equally clear that the Project Manager had been wrong.

Studies of Yucca Mountain directed at air flow through the unsaturated zone above the water table, where the waste potentially would be emplaced, resulted in calculations indicating that airborne release of radioactive carbon-14 would exceed the EPA standard’s radionuclide release limit by a factor of 6 to 8. DOE’s attempts to have EPA revise the standard to allow for the expected carbon-14 release did not succeed after scientific scrutiny by a special panel of experts convened by EPA. DOE’s efforts to have the National Academy of Sciences National Research Council Board on Radioactive Waste Management endorse a relaxation of the EPA standard also were unsuccessful after the Board examined the technical issues.

Congress then set a course to try to save Yucca Mountain from later disqualification by including Section 801 in the Energy Policy Act of 1992 which mandated a new Yucca Mountain site-specific EPA standard, and subsequent revision of the NRC licensing rule to be consistent with the new EPA standard.

> "the [EPA] Administrator shall, based upon and consistent with the findings and recommendations of the National Academy of Sciences, promulgate, by rule, public health and safety standards for protection of the public from releases from radioactive materials stored or disposed of in the repository at the Yucca Mountain site. Such standards shall prescribe the maximum annual effective dose equivalent to individual members of the public from releases to the accessible environment from radioactive materials stored or disposed of in the repository." Section 801(a).

As instructed, EPA contracted with the NAS for a report of findings and recommendations to be titled "Technical Bases for Yucca Mountain Standards" which was published in 1995. Of interest in today's hearing is the report's finding that there is no scientific basis to limit the repository compliance period to 10,000 years as had been done in the original EPA standard; and, its recommendation: "We recommend calculation of the maximum risks of radiation releases whenever they occur as long as the geologic characteristics of the repository environment do not change significantly. The time scale for long-term geologic processes at Yucca Mountain is on the order of approximately one million years."

Page 71-72. The one million year period is referred to in the report as the period of geologic stability, during which, the report concluded, it is feasible to make a compliance assessment. The report also noted that, “In the case of Yucca Mountain, at least, some potentially important exposures might not occur until after several hundred thousand years.” Page 55.

In June, 2001, EPA promulgated its rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada (40 CFR Part 197). The rule set a regulatory period of 10,000 years for compliance with EPA’s maximum individual dose standard, which was set at 15 millirems per year. A separate groundwater protection standard was also set for the 10,000 year regulatory period, with dose and radionuclide concentration limits consistent with Safe Drinking Water Act standards that apply to all the nation’s public drinking water supplies. The rule did acknowledge that peak expected doses could occur after the 10,000 year regulatory period and required DOE to calculate the peak individual dose during the period of geologic stability after 10,000 years and include the results in the Yucca Mountain Environmental Impact Statement “as an indicator of long-term disposal system performance.” But the rule further states that “No regulatory standard applies to the results of this analysis.” Sec. 197.35.

Nevada and others (Nuclear Energy Institute, Natural Resources Defense Council, and several other environmental public interest organizations) challenged the EPA standard in lawsuits filed in the U.S. Court of Appeals for the District of Columbia Circuit in July 2001. Among Nevada's and others' issues was that the setting of a 10,000 year regulatory period was not "based upon and consistent with" with the findings and recommendations of the NAS, as required by the Energy Policy Act of 1992. The Court upheld this challenge and vacated that portion of the EPA standard that applied a 10,000 year regulatory period, as well as the portions of the NRC licensing rule (10 CFR Part 63) that adopted EPA's 10,000 year regulatory period. Nuclear Energy Institute v. Environmental Protection Agency, 373 F.3d 1 (D.C. Cir. 2004).

On August 22, 2005, EPA published in the Federal Register a Proposed Rule modifying 40 CFR 197 with respect to the Court's ruling. 30 FR 70, No. 161, pp.49015-49063. Nevada provided extensive comments on EPA's proposal before the close of the comment period in November, 2005 (comments are included with this statement). Since the close of the comment period, new information relevant to two aspects of the Proposed Rule has emerged, and Nevada has provided two Supplemental Comments to EPA, on December 21, 2005 and January 11, 2006 (also included with this statement).

EPA's proposed Yucca Mountain Standard is unprecedented in its adoption of a two-tiered standard, bifurcating radiation exposure limits to the period up to 10,000 years after disposal, and the period from 10,000 to one million years. It is further unprecedented in its application of a dose limit up to 10,000 years that is based on conventional risk apportionment, while applying, for the first time ever in U.S. or international regulation, a contrived and arbitrary background-based dose limit for the remaining time period. The proposed 350 millirem per year individual dose limit after 10,000 years is 23 time higher than the 15 millirem per year mean (or average) dose standard applied up to 10,000 years, and 87.5 times higher than the groundwater protection standard which EPA improperly proposes to truncate at 10,000 years.

The 15 millirem per year standard, as EPA has applied it to the initial 10,000 year period, is consistent with current and accepted radiation risk protection levels in other U.S. and international regulation. It also represents an apportionment for waste disposal of the generally accepted limit of 100 millirems per year from the entire uranium fuel cycle, which includes operation of nuclear power reactors.

EPA's 350 millirems per year median dose limit is based on the differential between EPA's current estimated (but not verified) background radiation dose in Amargosa Valley, below Yucca Mountain, and the estimated average background dose in the state of Colorado. EPA cites the average Colorado

background dose to be about 700 millirems per year (which is about double the national average), and estimates the Amargosa Valley background to be about 350 millirems per year. In essence, EPA's conclusion is that if 700 millirems per year background is acceptable to people in Colorado, it must be acceptable also for people in Amargosa Valley. Therefore, in EPA's view it is reasonable to impose an additional dose from the repository of 350 millirems per year in order to achieve an individual dose of 700 millirems per year. EPA rationalizes its approach by saying that such exposures that are expected to occur several hundred thousand years into the future should not be considered to "pose a realistic threat of irreversible harm or catastrophic consequences." 70 FR 161, August 22, 2005, at 49039.

The numerous scientific and ethical flaws in EPA's approach are elaborated in our comments, and a supplemental comment, to EPA on its proposed standard. Foremost is that the Colorado average background dose includes 87% indoor radon exposure (over 600 millirems per year) which can be mitigated primarily by home ventilation, and is the focus of a major EPA radon abatement program nationwide, executed by the same EPA division that has proposed this standard. There is also U.S. policy, adopted by Congress, to bring indoor radon levels down to the very low level included in natural outdoor radiation exposure. It appears EPA believes its own indoor radon program and national policy on abatement will fail, and are of no regard in its setting of standards for Yucca Mountain.

EPA's choice to use a median dose limit for compliance determination is also disingenuous and scientifically unsupportable. The median dose is the dose level for which half of the scenarios calculated are larger, and half are smaller, and it does not reflect the range of dose levels. In DOE's performance calculations, at peak dose, a 350 millirem per year median dose is the equivalent of a 1050 millirem per year average dose.

We have concluded that EPA's proposal is not only unlawful, in that it is not consistent with the findings and recommendations of the NAS and therefore in violation of the Energy Policy Act of 1992, but has no justifiable scientific or ethical basis in its cavalier flaunting of all human radiation protection regulation worldwide.

The premise of the NAS Technical Bases report is simple and straight forward - humans must be protected from the maximum radiation risk from a nuclear waste repository, whenever that risk is projected to occur. If this protection cannot be reasonably assured at the outset, the problem is with the selected repository site and design, not with the premise. EPA's selection of a one million year regulatory period is a reflection of the NAS finding that compliance assessment is feasible through that time period for most physical and geologic aspects of a repository at Yucca Mountain, given our knowledge and understanding of the natural characteristics and features and processes at

Yucca Mountain and in the surrounding area. The wide range of possible assumptions about the longevity of the metal waste containers coupled with our current understanding of the physical and hydrologic characteristics of Yucca Mountain indicate it is very likely that the calculated peak individual dose will occur sometime during the million year period of geologic stability. If there were no metal containers and shields protecting the waste from infiltrating water, DOE's calculations for time of peak dose (in the Site Recommendation performance assessment) put the average peak at about 2,000 years after repository closure. Using DOE's optimistic projections of the rate of container failure, the performance calculation shows the time of peak dose at between 200,000 and 300,000 years after closure. The magnitude of the calculated peak dose, in both cases is approximately the same, and both far exceed 15 millirems per year. In the case with no metal waste containers or shields, a 15 millirem per year standard would be exceeded within 500 years after closure of the repository.

The compliance test for a repository is whether there is reasonable expectation that the statistical maximum dose (or risk) to humans from releases from the repository fall within a pre-established regulatory dose limit. It is of great importance that the complex performance calculation is scientifically credible because the compliance decision is to be made prior to waste emplacement. After the waste is disposed and the repository is sealed, the performance calculation has no relevance as to how the repository will actually perform, and

when the maximum dose to individuals will occur. It could appear in as little as a few thousand years. The wide range of uncertainty in performance is dominated by the great uncertainty surrounding not the geology and hydrology, but the failure rate of the metal waste containers. Once the waste containers begin failing by corrosion, the contamination of the groundwater will be relatively rapid, far reaching, and irreversible. Radionuclides from waste disposed at Yucca Mountain will eventually reach the land surface both through groundwater pumping and through natural playas and springs where groundwater that has traveled beneath Yucca Mountain reaches the land surface today.

We have concluded that EPA must withdraw its proposed Yucca Mountain standard and reissue a new draft that:

- does not promote arbitrary and scientifically unjustified bifurcated radiation exposure limits,
- continues strict groundwater protection requirements through the time of maximum radiation exposure from a Yucca Mountain repository,
- eliminates statistical gerrymandering through the use of median versus mean calculations, and that adheres to EPA's traditional health and risk based approach to radiation and environmental protection in accord with national policy.

EPA has indicated that it would like to have its final Yucca Mountain standard in place sometime this calendar year, and as soon as possible so as not to hinder DOE's ability to submit a license application to NRC in the near future.

Under current circumstances in the DOE repository program, EPA's withdrawal of its proposed standard, and issuance of a legally, scientifically, and morally sustainable proposal will not impede the DOE's plans for license application.

DOE has officially informed the NRC that it has no schedule for when it will submit a license application to the NRC, and that it does not know when it will have such a schedule. This announcement is a consequence of multiple ongoing changes, events and circumstances in the program, all remaining unresolved to the extent that a license application is unlikely within the period of time that a diligent EPA would take to reissue a proposed Yucca Mountain standard, and finally promulgate a defensible standard.