

**TESTIMONY OF MARTIN G. MALSCH
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U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENVIRONMENT AND THE ECONOMY
JUNE 1, 2011**

Mr. Chairman, member of the Subcommittee, my name is Martin G. Malsch. I appreciate the opportunity to provide testimony on behalf of the State of Nevada at this hearing today. I have practiced law in the nuclear energy and nuclear waste fields for over forty years, in both the public and private sectors, and I am a Special Deputy Attorney General for the State of Nevada.

Background

The failure of the Nation's geologic repository program is a direct result of various decisions that were taken beginning almost twenty-five years ago. A decent respect for history would have suggested that those decisions created a very high risk of program failure, but the lessons of history were disregarded. Ironically, the original Nuclear Waste Policy Act of 1982, signed into law by President Reagan with substantial bipartisan support, foresaw many of the problems that now afflict the Yucca Mountain program, and Congress sought to avoid them through a series of carefully constructed provisions designed to achieve both safety and credibility. The systematic dismantling of the Act by Congress in 1987, followed by related agency decisions that undermined both safety and credibility, lead to the situation we find ourselves addressing today. To see why we failed, and how failure was virtually inevitable, a brief history of the geologic repository program in the United States is in order.

History

Four events in the history of DOE's and its predecessor agencies' attempts to address the high-level waste problem stand out in this regard: Lyons, Kansas; the site nomination and selection process

under the 1982 NWPA; the 1987 NWPA amendments; and current NRC legal proceedings associated with the filing of DOE's license application.

In the 1960s a clamor arose over the potential that high-level radioactive wastes would leak from Atomic Energy Commission (AEC) storage facilities located at the National Reactor Testing Station in Idaho, the Savannah River Site in South Carolina, and the Hanford Site in Washington. As a result, the AEC promised Idaho Senator Church that the Idaho wastes would be transferred out of Idaho to a permanent geologic repository by the end of the 1970s. The AEC pinned its hopes on an abandoned salt mine in Lyons, Kansas. However, rather than taking the time to complete necessary scientific investigations, the AEC offered disputable safety conclusions and pressed ahead. Ultimately, the Lyons, Kansas site proved to be unsuitable. The AEC also bungled the political aspects of the debate. It knew that State and local support was essential, but it lost that support when it failed to give any credence to the legitimate concerns of Kansas experts and it effectively committed to the project before the scientific studies were completed.¹

Two lessons may be learned from Lyons, Kansas. The first is that the Federal Government should not commit or even appear to commit to a repository site unless the necessary scientific investigations are completed and the legitimate safety concerns of State and local experts are addressed satisfactorily. The second is that State and local support is critical to success.²

After Lyons, Kansas, failed, the AEC's successor agencies continued to investigate other possible repository sites and the Congress enacted the NWPA in 1982. In accordance with the NWPA, DOE selected five sites for more detailed study (characterization): salt deposits in Mississippi, Texas, and

¹ J. Samuel Walker, "The Road to Yucca Mountain," University of California Press, 2009 (Walker), at 50-51, 74-75. Mr. Walker was the NRC Historian, and this book is the fifth in a series of volumes on the history of nuclear regulation sponsored by the NRC. The book does not represent the official position of the NRC.

² Walker at pp. 74-75

Utah; basalt formations in Hanford, Washington; and volcanic tuff rock in Nevada.³ In perhaps a hint of what was to come, potential sites in Louisiana were excluded based on a political side agreement between Louisiana Senator Johnston and the Secretary of DOE, known to Congress when the NWPA was enacted.⁴ The NWPA then called upon DOE to narrow the choices to three, all three of which were to be fully characterized (studied) so that any one failure would not prematurely destroy the whole repository program.⁵

In 1986, the DOE Secretary announced that the final three choices were the ones in Deaf Smith County, Texas; Yucca Mountain, Nevada; and Hanford, Washington. The designation prompted angry protests from all three areas, whose representatives believed that the scientific investigations were not completed, and the protests became part of a nationwide movement when DOE cancelled the search for an eastern site, notwithstanding a clear informal agreement among NWPA supporters that the second site called for by the NWPA would be located in an eastern State.⁶

The program was now in shambles, program costs were increasing, and the nuclear power industry argued (incorrectly, as it turned out) that the Nation faced a spent fuel storage crisis that might require shutdown of nuclear power plants. Congress reacted by enacting the Nuclear Waste Policy Act Amendments Act of 1987. That Act directed DOE to limit its future site characterization and selection efforts to Yucca Mountain, Nevada, notwithstanding the advice from NRC (and others) that the scientific information was insufficient to make an informed safety conclusion about the suitability of the site.⁷ In

³ Walker at 181-182.

⁴ The agreement was discussed during Senate debates on the enactment of the NWPA. 128 Cong. Rec. D485 S41430, April 28, 1982.

⁵ 42 U.S.C. § 10132 (b) and 10133.

⁶ Walker at 182.

⁷ 42 U.S.C. 10172; prepared testimony of Robert Bernero, June 29, 1987, appearing in S. Rep. No. 100-152, 100th Cong., 1st Sess. at 194 ("At the Yucca Mountain site, the major issues include geological concerns such as the presence of potentially active faults and related ground motion, the potential for volcanism, and the origin and significance of mineral veins in the area. Hydrology is also a concern in the saturated and unsaturated zones; groundwater flow patterns and regimes and travel times have yet to be fully determined. As at Hanford, the ability

fact, the selection of the Yucca Mountain site was based on DOE's so-called "Multiattribute Utility Analysis of Sites," which depended in important part on the assumption that little groundwater would move downward from the Mountain top and seep into the tunnels where the waste would be disposed of, and this assumption later proved to be false.⁸

The NWPA Amendments Act of 1987 attempted to place the entire high-level waste disposal burden on one western state with no nuclear power plants or other high-level waste generating facilities. The supporters of the NWPA Amendments Act of 1987 flagrantly ignored both of the lessons learned from Lyons, Kansas. First, they effectively committed the Nation to a single disposal site not only before the necessary scientific investigations were completed, but also before any final licensing standards were in place.⁹ Second, supporters ignored the objections of the host State, which believed (with good reason) that Nevada had been singled out simply because it was "the small kid on the block."¹⁰

By 2001, DOE had spent about \$4.5 billion characterizing the Yucca Mountain site, and its efforts established that the site was more complex than originally thought and that (as indicated above) the underground environment was not as dry as Yucca proponents had expected.¹¹ But DOE pressed

of the medium (tuff) to retard movement of radionuclides is not yet well understood." Mr. Bernero was the Deputy Director of the NRC Office in charge of evaluating the safety of high-level waste disposal facilities. NRC did not object to studying (characterizing) Yucca Mountain further.

⁸ Compare the June 29, 1987 testimony of Donald L. Vieth, DOE Project Manager, Waste Management Project Office, Nevada Operations Office, appearing in S. Rep. No. 100-152, 100th Cong., 1st Sess. at 133, 138 "[L]ittle groundwater is expected to be available to dissolve and move the waste even if a waste canister is damaged," with DOE's June 2008 license application at 2.1-21 ("On average over all waste packages, the amount of seeping water is 1.2, 4.6, and 14.4 kg/yr per waste package for the present-day, monsoon, and glacial-transition climate states, respectively," There are 11,000 waste packages (2008 application at 1-10), so this means the total seepage ranges from 13,200 to 158,400 kg of water per year. Accordingly, DOE plans to install thousands of titanium alloy drip shields in the tunnels "to divert seepage away from the waste packages." June 2008 license application at 2-7. However, eventually the drip shield and waste packages are all degraded by corrosion. *Id.*

⁹ Final and complete NRC licensing regulations were not in place until 2009. See 74 Fed. Reg. 10811 (March 13, 2009).

¹⁰ Walker at 182.

¹¹ Walker at 183.

forward with Yucca Mountain much like its predecessor AEC pressed forward with Lyons, Kansas. In February 2002, DOE Secretary Abraham formally recommended the Yucca Mountain site to President Bush, notwithstanding the Nuclear Waste Technical Review Board's conclusion that DOE "has yet to make a convincing case that nuclear waste can safely be buried at Yucca Mountain."¹² President Bush promptly agreed with Secretary Abraham and recommended the site to the Congress. Citing numerous scientific flaws, Nevada Governor Guinn formally disapproved of the site, using the state veto procedure set forth in the NWPA.¹³ Congress then formally overrode Nevada's veto by enacting H.J. Res. 87. The designation of Yucca Mountain as a repository site then became effective on July 23, 2002, when the President signed S.J. Res. 34 into law.¹⁴

The NWPA required DOE to file its license application within 90 days after the President's site recommendation became effective, or by October 21, 2002.¹⁵ October 21, 2002 came, went, and receded into history without any application being filed. This was not a surprising development, given the scientific and engineering challenges DOE still faced when Nevada's veto was overridden. DOE also failed to plan adequately to meet NRC's pre-application discovery requirements.¹⁶ DOE's plan to file its application in 2004 (one of many such plans with progressively later filing dates) was aborted and the application was not filed and docketed by the NRC until September 8, 2008, more than five years after the statutory deadline.

¹² Hearings before the Senate Committee on Energy and Natural Resources on S.J. Res. 34, May 23, 2001, at 157. The Board elaborated that DOE's safety case was only "weak to moderate." *Id.* The Board was established by Congress to advise DOE on repository safety. Its members were (and are) appointed by the President based on recommendations from the National Academy of Sciences. 42 U.S.C. §§ 10261-64.

¹³ Walker at 183.

¹⁴ 42 U.S.C. § 10135 *note*.

¹⁵ 42 U.S.C. § 10134(b).

¹⁶ *U.S. Department of Energy (High-Level Waste Repository, Pre-Application Matters)*, LBP-04-20, 60 NRC 300 (2004).

The NRC then admitted over 300 contentions (formal objections to the application) as matters in controversy in the NRC Yucca Mountain licensing proceeding, more than in any other case in the history of NRC licensing.¹⁷ All of the technical contentions were supported by the equivalent of an expert report under F. R. Civ. P. 26 (a)(2)(B) and, accordingly, the NRC found that each of them presented a “genuine dispute” supported by “facts or expert opinions.”¹⁸ DOE faced other serious obstacles. For example, at the time DOE’s motion to withdraw its license application was filed on March 3, 2010, no significant progress had been made on funding or constructing the enormously expensive rail line that would be necessary to transport high-level nuclear waste through Nevada to the site in the safest manner. Construction and operation of a repository would require the appropriation of water resources owned by the public and administered by the State of Nevada, and the State vigorously opposed the granting of the necessary State water use permits. A disinterested observer would reasonably conclude that a repository at Yucca Mountain would probably never be built and operated, even if the necessary NRC licenses were granted.

In the meantime, the near crisis atmosphere that permeated the Congressional debates over the original NWPA has completely dissipated. In 1982, NRC licensees and the Congress were gravely concerned that nuclear power plants would shut down because of a lack of adequate storage space for spent reactor fuel that was piling up in storage pools pending disposal.¹⁹ When DOE moved to withdraw its application twenty eight years later, more than 50 independent spent fuel storage installations across the United States stored more than 45,000 spent fuel assemblies and greater-than-Class C waste in

¹⁷ See *U.S. Department of Energy (High Level Waste Repository)*, CLI-09-14, __ NRC __ (2009).

¹⁸ 10 C.F.R. § 2.309 (f)(1)(v) and (vi).

¹⁹ See NWPA section 111(a)(2), 42 U.S.C. § 10131(a)(2). Senator Alan Simpson, a key supporter of the NWPA, declared in 1982 that “[w]e’re about to bring the nuclear industry to its knees unless we act now.” Walker at 176.

more than 1,200 dry storage casks.²⁰ The NRC opined that such dry storage would be safe for at least 100 years and is evaluating whether it may be safe for 300 years.²¹

Loss of Program Credibility

The original Act sought to assure the extent possible that potential repository sites would be identified and evaluated based on objective technical and scientific criteria. It also sought fairness and redundancy by requiring multiple sites from which to choose ultimate locations for repositories, and it strove for regional equity by setting up site selection programs for two facilities – one in the west and one in the east. In 1987, Congress scrapped both the multi-site process and the concept of regional equity that were the cornerstones of the 1982 law. It directed that all repository development efforts focus on just one site in Nevada, notwithstanding the incompleteness of the scientific information and the fact that spent reactor fuel and high-level waste from every region of the Country would be sent to a single western State with no nuclear power plants or high-level radioactive waste generating facilities.

The 1987 amendments lead to a devastating loss of trust in the overall program and ever increasing opposition on the part of the State of Nevada and its citizens. Further actions by DOE, EPA, and NRC then further undermined the credibility of the program. Prior to 1987, DOE's focus – while certainly not without problems – was essentially on identifying safe and suitable sites for a repository. The question that guided investigations at each of the candidate sites was, "Is this site suitable for development as a repository?"

After 1987, that changed drastically. Now there was only one possible site, and the focus changed to efforts to vindicate Congress' choice. Inevitably, as more and more dollars were spent, it became progressively more important to avoid admitting that the selection of Yucca Mountain had been

²⁰ NRC "Plan for Integrating Spent Nuclear Fuel Regulatory Activities," Revision 00, June 21, 2010, at C-1.

²¹ Supra note 20 and COMSECY-10-1007, Enclosure 1 at 10.

a mistake. Technical problems, even site conditions previously considered to be disqualifying, became obstacles to be overcome by ever-more-exotic engineering fixes, some designed to protect the waste from adverse conditions in the mountain, contrary to the original concept that site geology would protect man and the environment from the waste. When it appeared likely that the Yucca Mountain site could not satisfy certain NRC licensing requirements designed to achieve safety defense-in-depth, NRC eliminated the requirements. And, when DOE safety analyses showing that releases of radioactive materials in groundwater would result in doses in excess of EPA safety standards after 10,000 years, EPA and NRC unlawfully declared that releases after 10,000 years would not count in determining compliance. All of these actions, by Congress and then by DOE, EPA, and NRC, utterly destroyed the credibility of the program.

Opposition to the Yucca Mountain project in Nevada was not always a given. Early on while the NWPA of 1982 was being put together and immediately subsequent to its passage, Nevada, while skeptical of DOE's ability to implement a scientifically credible site screening process, essentially took a wait-and-see approach. In 1986, the first chairman of the Nevada Commission on Nuclear Projects, former Governor Grant Sawyer, laid down the criteria by which the state would judge DOE:

"... [A] nuclear waste repository should not be built until it can be shown, beyond the shadow of a doubt, that the facility can, in fact ... isolate radioactive materials from the biosphere for more than 10,000 years - and that ... such a repository will be benign in its effects upon the people, the environment and the economy of the state or region within which it would be located."

When DOE and Congress abandoned the site selection process of the original Act in 1987, things changed drastically. Public opinion, which until then had been mixed with regard to Yucca Mountain, solidified into strong, across-the-board opposition. In biannual surveys done between 1989 and 2010, opposition to the project has remained constant at between 63% and over 70%.

While there has been and continues to be some local government support for the project in small rural counties surrounding the site (although according to survey data, that support is by no means overwhelming or shared by all residents), such support should not be extrapolated to the wider Nevada population. Nevada's population is roughly 2.6 million, with over 1.8 million in Clark County and the greater Las Vegas area. By contrast Nye County, where Yucca Mountain is located, has less than 45,000 people. Taken together, the six counties sometimes cited as evincing some level of support for DOE's program comprise only a tiny fraction of the overall State citizenry.

In 2002, the State of Nevada carefully evaluated the effects a prospective Yucca repository would have on the State and its communities and economy²². That report documents the potential, among other things, for major economic consequences arising out of the Yucca project, including significant risks to Nevada's unique tourism-based economy, property value losses due to the transportation of spent fuel and high-level waste through the state, as well as disastrous consequences in the event of accidents or incidents of terrorism related to waste being shipped to the facility. The report concluded:

“Given the unique reliance of the Nevada economy on the State’s ability to attract tens of millions of tourists and visitors annually, any impacts that reduce the number of visitors, especially to southern Nevada, would have major consequences for the State’s economy. Consequently, the most serious and possibly catastrophic economic risk for Nevada stemming directly from the Yucca Mountain project is the potential for stigma impacts on the tourist and visitor industry. Such impacts would produce significant losses to an economy dominated by visitor-based revenues.”

²² [A Mountain of Trouble, A Nation at Risk: Report on Impacts of the Proposed Yucca Mountain High-Level Nuclear Waste Program](http://www.state.nv.us/nucwaste/yucca/impactreport.pdf) (February 2002) Ref. <http://www.state.nv.us/nucwaste/yucca/impactreport.pdf>

This broad perspective on how the project would affect the State provides a critical basis for the State of Nevada's determined opposition to locating a geologic repository at Yucca Mountain.

The GAO Report, "Effects of a Termination of the Yucca Mountain Repository Program and Lessons Learned," and the Situation Today

In its recent report, GAO report states that DOE's decision to seek withdrawal of the Yucca Mountain license application was made for non-safety reasons. However, GAO made no systematic effort to evaluate the many safety problems that remain unresolved. These problems go to the heart of Yucca Mountain's suitability as a repository and Nevada's opposition to it. They include:

- the rapid movement of water within the subsurface and fast radioactive waste pathways to the accessible environment;
- the likelihood of major waste package corrosion;
- the unstable and highly fractured nature of the host rock and the problems that causes for safety analyses, waste isolation, retrieval, the installation of engineered barriers; and
- the risk of volcanic eruptions below and then through the repository that would disperse radioactive materials to the environment.

Accordingly, from Nevada's perspective, DOE's decision to seek a withdrawal of the license application avoided both significant safety problems and further wasting of taxpayer and ratepayer dollars on a flawed and hopeless project.

Some Lessons Learned

In its 2010 report to the Nevada Governor and Legislature²³, the Nevada Commission on Nuclear Projects identified some of the key findings and lessons to be learned from the Yucca Mountain experience. The findings include:

- While Yucca Mountain failed for many reasons, a critical element was unquestionably the forced nature of the site selection process.
- If DOE had been required to obtain the State's informed consent to continue with the project, Yucca Mountain would have been disqualified years earlier, and billions of dollars and years of effort would have been saved.
- Yucca Mountain was an extremely poor site from the beginning.
- DOE was probably the wrong entity to implement the federal high-level radioactive waste program and placing the program within DOE may have doomed it from the start.

The lessons learned include:

- A successful repository facility siting program must be premised on the fully informed consent of the host state, tribe (if applicable) and local community.
- Any future siting effort must be based on and motivated by irrefutably sound science.
- A scientifically credible repository siting process must have as its foundation objective and rigorous criteria against which the geotechnical suitability of a site would be evaluated.
- The criteria must be established in advance of the siting effort and not structured so as to apply only to specific sites. The application of the criteria to candidate sites must be objective and above reproach, and criteria cannot be changed based on conditions found when studying or characterizing various sites.

Conclusion

²³ Report of the Nevada Commission on Nuclear Projects to the Governor and Legislature of the State of Nevada (December 2010) Ref. <http://www.state.nv.us/nucwaste/news2011/pdf/comm2010summary.pdf>

It is sometimes difficult to terminate a Federal project when large amounts of money have been spent. But there is no sense in adding good money after bad. What's done is done and we should look to the future for better solutions, guided by the lessons of Lyons Kansas and Yucca Mountain, and the recommendations of the Blue Ribbon Commission on America's Nuclear Future. DOE's finding that Yucca is unworkable, the decision to seek withdrawal of the license application, and the establishment of the Blue Ribbon Commission to look for alternatives for the management and storage of spent nuclear fuel, were the right things to do. They have the potential to put the Country on a path to a safer, more cost-effective and expeditious solution to managing spent fuel and high-level waste.

A key lesson to be learned from Nevada's experience with DOE and the Yucca program is that the Federal Government cannot seek to force a geologic repository on an unwilling state based on incomplete information, press forward with the repository in the face of growing scientific difficulties, and still expect the effort to be successful. At the least, there must be a steadfast and unwavering commitment to scientific credibility, openness and transparency, and a willingness to allow the science to take its course and let the chips fall where they may.

Thank you for the opportunity to address the Subcommittee today. I would be happy to answer any questions.