

## **Yucca Mountain in Brief**

Nuclear weapons production and nuclear power reactor operation for electricity produce significant amounts of high level and other nuclear waste. To protect life on earth, as we know it, these materials must be isolated from the biosphere, essentially forever. In 2002, the plan to isolate these materials at Yucca Mountain for ten thousand years was judged to be inadequate – the D.C. District Court ruled that standards need to address a one million year time frame! In addition to being in a high risk earthquake area with volcanoes the Yucca site violates environmental justice, the Ruby Valley Treaty of 1863 and Native American sovereignty.

Nuclear waste is an issue that needs urgent attention. However, flawed, temporary and ad hoc plans endanger current and future generations. The highest scientific and technical specifications must be rigorously followed to ensure long-term protection of public health and wellbeing.

With the opening of a new session of Congress, there may be yet another ill-conceived effort to revive the proposed and administratively cancelled Yucca Mountain high-level nuclear waste repository program, which has been dormant since 2010 – the site is undeveloped except for an entrance tunnel and is not appropriate for receiving nuclear waste. It is useful to review elements of the long history of the Yucca project that have led to its current state of near demise and assess whether the national interest in the safe, long term isolation of commercial and weapons related high-level nuclear waste would best be served by officially abandoning the project as irrevocably flawed and seek a fresh, consent-based and technically rigorous start at meeting the nation’s need for safe management and disposal of these long-lasting, highly dangerous wastes.

Throughout this process, there have been repeated efforts to consolidate high level waste prior to having an operating permanent place to isolate it. These proposals consistently and rightly have been rejected.

It is now just over 31 years since Congress passed the 1987 Nuclear Waste Policy Amendments Act that terminated the deliberative national nuclear waste repository site screening process, and instead, made decisions based on political power rather than sound science. Thus, the Yucca Mountain, Nevada candidate site became the only site for potential repository development. Five years later, in 1992, Congress instructed the Environmental Protection Agency to craft a radiation protection standard

specific to the Yucca Mountain site *because it was generally agreed by an EPA Science Advisory Board panel that the site could not meet the “generally applicable” safety standard required by the 1982 Nuclear Waste Policy Act for judging the adequacy of any potential repository site.* The Nuclear Regulatory Commission was instructed to conform its repository licensing rules to the new EPA Yucca Mountain specific standard.

The 1987 Amendments Act retained the original Act’s requirement that the Department of Energy establish Site Recommendation Guidelines that among other things define factors to qualify or disqualify potential repository sites’ consideration as a candidate site. Just prior to the Secretary of Energy’s 2002 Site Recommendation of Yucca Mountain to the President, the Department of Energy amended the Site Recommendation Guidelines to eliminate those factors that would qualify or disqualify a site and thus preserved Yucca Mountain as the only site to be considered for repository development. Nevada governors twice, first in 1989 and again in 1999, had informed the Secretary of Energy that the site should be disqualified because of substantial evidence that the site did not meet the required minimum groundwater travel time from the repository waste-emplacement-zone to the accessible environment, a factor critical to the site’s ability to isolate radioactive waste. The response to both governors’ letters was that DOE was still studying the site. DOE’s ultimate response was to repeal the guidelines that Yucca Mountain could not meet and would make the site unsuitable for further consideration.

Nevada’s statutorily permitted Notice of Disapproval of the President’s recommendation of the Yucca Mountain site to Congress was overridden by the House and Senate in 2002. According to the Act, DOE then had up to 90 days to submit a Yucca Mountain repository site license application to the Nuclear Regulatory Commission. DOE intentionally ignored this requirement in its rush to a Site Recommendation, and it was not until June 2008, six years later, that DOE submitted its Yucca Mountain repository license application to NRC, months prior to promulgation of a final radiation protection standard, which prompted a 2009 revision of the application.

Nevada timely filed a petition to intervene in the NRC licensing proceeding and had 218 contentions admitted for adjudication. Other intervening parties brought the total contentions to about 300 – by far a record for any NRC adjudicatory proceeding. In its early substantive review of the license application, NRC Staff issued 642 Requests for Additional Information, 50 of which resulted in DOE’s commitment to update its license application, which has not taken place since the licensing proceeding

was suspended in 2010, and remains suspended today, for lack of appropriations from Congress. Prior to the 2010 suspension, DOE had unsuccessfully moved to withdraw its license application as being “unworkable” for reasons later specified to include the unrelenting resistance to the program by Nevada. Nevada leadership has communicated numerous times that it does not consent to a Yucca Mountain nuclear waste repository, and vows that it will not consent to it.

Following the suspension of the proceeding, the States of Washington and South Carolina, and Aiken, South Carolina brought NRC into the Circuit Court of Appeals for the District of Columbia by claiming the suspension was unlawful. The court ordered NRC to continue the licensing process as long as it had unexpended appropriated funds from prior years, but it could not order NRC to proceed if no further funds were appropriated. To date NRC has spent nearly all of its carry-over funds writing a needed Supplemental Environmental Impact Statement on groundwater impacts and a Safety Evaluation Report that presents the NRC Staff position on the adequacy of the license application to provide “reasonable expectation” that the repository will meet the specifically tailored radiation protection standard for Yucca Mountain. The Staff concluded that its position is, should there be an adjudication of the application, that it meets the required safety standard, but it lacks the required Congressional land withdrawal for the site, and an appropriation of water rights, which Nevada had earlier denied.

Aside from the 50 commitments to update the license application noted above, a massive revision of the license application is necessary because the repository design and safety analysis is based on a disposal waste package concept that DOE has abandoned due to the evolution of waste storage technology at nuclear reactor sites during the period of dormancy of the project. The plan in the application was to have the waste removed from reactor cooling pools and placed directly into an industry-wide uniform canister whose specifications are the basis of the design and safety analysis of the Yucca Mountain repository. The canisters would then be part of an integrated system of storage, transportation, and disposal. The design and regulatory certification work for the canister was abandoned by DOE shortly after the licensing process was suspended, and in the meantime reactor owners have been purchasing, and will continue to purchase, a wide variety of containers for at-reactor storage of their irradiated (“spent” or “used”) nuclear fuel, none of which even approach the specifications of the planned canister consistent with the repository design. Repackaging the irradiated fuel into canisters meeting the original specifications has significant time, expense, and worker exposure issues that will continue to grow as irradiated fuel is discharged from operating reactors. It is unknown what path DOE would take to proposing a waste package for disposal at Yucca Mountain.

Because the fractured characteristic of the rock at Yucca Mountain provides pathways for infiltration of precipitation water through the underground location of the waste, DOE has designed a relatively corrosion resistant disposal container for the planned canister. But it is known that the container will eventually fail and infiltrating water will carry the waste radionuclides to the water table and the accessible environment. In an attempt to further delay release of the waste to the environment, DOE has planned installation of 11,500 titanium drip shields over the containers to deflect water that would drip onto the containers. The ability to perfectly install the 5 ton drip shields with complex waterproof interlocking joints using robots in a high heat and radiation field has not been demonstrated and may not be possible if there is rock fall in the unmaintainable tunnel. Installation of the drip shields is planned for the final ten years of the 100 year operating lifetime of the repository at a cost estimated at \$5 to \$9 billion in 2018 dollars. Of course, if the statutory capacity of the repository is expanded, as proposed in H.R. 3053 last year, or eliminated entirely, the drip shield cost increase could more than double. *The question for Congress today is, "Are you willing to commit the country to an expenditure of multi billions of dollars at least 100 years from now on an unproven technology after all the waste has been emplaced underground?" Such a commitment is necessary because without the drip shield, DOE's own analysis formula shows that the radiation protection standard will be violated, and the site would be unsuitable for disposal.*

If there is intent to revive the Yucca Mountain repository project some near-term commitments are required. At least \$2 billion will be required to complete the licensing process over the next few years, with no assurance of how long it will take. If a license is approved, it assuredly will be followed by extensive litigation. A new 300 plus mile rail line to Yucca Mountain must be approved and constructed, and a portion realigned from the original plan because of a recent National Monument designation. Initial repository (without rail line) construction costs would require appropriations of over \$1 billion (2008 dollars) per year. Complete construction of the statutory 70,000 metric ton repository would require boring at least 40 miles of new tunnel at Yucca Mountain.

**The Yucca Mountain project has a unique and troubling history; the geology of the site is known to not be capable of isolating nuclear waste; the 2008 license application repository design and safety analysis requires significant revision; and the safety of the site remains to be heavily contested in an unprecedented licensing hearing of uncertain outcome. It is time to abandon this failed Yucca Mountain nuclear waste repository project and open the way for a new nuclear waste policy.**