YUCCA MOUNTAIN

Introduction

Yucca Mountain as a national nuclear waste repository, which according to the most recent information from the U.S. Department of Energy, will not be ready to accept spent fuel before 2017. Numerous reasons have caused the delay, including scientific, technological, political, economic and legal problems.

The issue of permanently burying spent fuel from nuclear power reactors and high-level radioactive waste from nuclear weapons activities has always been a thorny issue for governments worldwide. No high-level nuclear waste repository exists today.

In the first years of the 21st century, about 56,000 metric tons of spent nuclear fuel have piled up at 103 reactors in 39 states, plus another 15,000 metric tons of high-level waste from the nuclear weapons complex since the dawn of the atomic age.

Yet a nuclear waste repository at Yucca Mountain remains in the distant future. Politics have often trumped engineers and scientists. As in the case of the Goshute Indian tribe in northwestern Utah, one that received a license in 2005 from the Nuclear Regulatory Commission for temporary storage of nuclear utilities' spent fuel on its reservation, the state stepped in and delayed the opening of the storage facility. The Utah tribe's plan has been suspended after Congress created a roadless wilderness area around the reservation. Unless the Bureau of Land Management allows a road through the wilderness area, there will not be a Utah storage site.

History of Repository Search

In 1957 the National Academy of Sciences first focused on a solution to the high-level nuclear waste problem, suggesting it should go into a deep geological repository. In 1970 the Atomic Energy Commission, precursor to the Department of Energy, selected an old salt mine in Lyons, Kansas as the nation's first repository. However, the old mine was anything but watertight. A nearby mine and gas drill holes allowed water to move inside the Lyons mine, something the AEC didn't know before it designated it as a repository. The failure of the Lyons project halted any federal efforts to create a repository and above-ground storage became an alternative solution to nuclear wastes. Nuclear utilities built pools of water to store the thermally and radioactively hot fuel until a more permanent solution became available.

After India detonated a nuclear device, code-named Smiling Buddha, with plutonium in 1974, using nuclear material coming from its Cirus research reactor, U.S. President Gerald Ford banned a plan by the nuclear industry to reprocess nuclear waste in fast breeder reactors. Ford ``indefinitely deferred'' reprocessing and President Jimmy Carter continued the ban, designed as an example for other countries to avoid possible diversion of plutonium for nuclear weapons. Every American president since then continued the ban, except for Ronald Reagan. Reagan agreed to allow reprocessing, but the nuclear industry discovered that reprocessing was too expensive, compared to cheap supplies of uranium available from friendly nations and it would be less expensive to bury spent fuel in a geologic repository.

Congress Takes Action

The nuclear industry watched spent fuel mount at reactor sites, until Congress reacted in 1982 and enacted the Nuclear Waste Policy Act. The act established long-term geologic repositories for high-level nuclear wastes. Congress ordered the Energy Department to identify sites and evaluate them. The Environmental Protection Agency was responsible for developing standards that the Nuclear Regulatory Commission would use to determine whether a site should be licensed. The act required the federal government to open a permanent repository by Jan. 31, 1998. It also required two national storage sites, one in the East and one in the West. The first repository required three locations selected by the Energy Department for site characterization, then the department had to compare them and present the best site chosen to Congress.

The State of Nevada Reacts

The state of Nevada and Clark County, the most populated county in the state, did not remain idle as action was taken at the national level. The state created the Nevada Commission on Nuclear Projects by law in 1985. The commission made up of seven members was to advise the governor and the Legislature on matters related to the disposal of radioactive waste and to oversee activities of the Nevada Agency for Nuclear Projects, which conducts technical and scientific studies of Yucca Mountain for the state. The Board of Clark County Commissioners also began to pass a series of resolutions, opposing Yucca Mountain as a nuclear waste repository.

By 1986 the DOE had selected Yucca Mountain, 90 miles northwest of Las Vegas, Deaf Smith County in the Texas panhandle, and the Hanford nuclear reservation in Washington state.

After the Energy Department ``indefinitely deferred'' a search for a second site in the east, because of a decreasing need for another repository, controversy erupted over the siting process. Texas, Washington and Nevada all feared that most of the nation's nuclear waste would land in their states. Congress cut funds for developing a geologic repository until the 1987 Nuclear Waste Policy Act Amendments were passed. The law narrowed repository research to Yucca Mountain as the sole site for study and delayed a decision on a second repository until 2010. It also stopped research on crystalline rock repositories in East Coast states that had enough political clout to take them out of the running. Sen. Paul Laxalt, R-Nev., managed to include studies on subseabed disposal in the final bill, but the idea was never funded by Congress or the White House.

The State Gears for a Fight

Nevada decried the 1987 amendments and declared them unfair. Opponents of the site said that it singled out a politically weak state – both Nevada senators at the time, Paul Laxalt and Chic Hecht were junior – with no nuclear power plants to become a dumping ground for some of the nation's most dangerous wastes. The state and anti-nuclear groups have been fighting a repository at Yucca Mountain ever since.

In 1988 the Clark County Commission created the Nuclear Waste Program of Comprehensive Planning, a local government branch to provide the commissioners with

Yucca Mountain project oversight, conduct economic and social assessments and provide for public outreach so the county could inform the fastest growing community in the nation about the repository process. The county, like the state and nine other counties, receives funding from Congress to do its work. The federal funds prohibit Clark County and the other state and local governments from lobbying, litigation and coalition efforts.

Scientific Questions Arise

By the 1990s the Energy Department knew it could not open a repository by 1998. Federal scientists discovered that water ran through the mountain faster than they had believed. DOE's own Los Alamos National Laboratory in New Mexico discovered the isotope Chlorine-36, which scientists identified from U.S. atomic bomb tests in the Pacific Ocean in the 1950s. The radiation was discovered 1,000 feet deep inside the mountain along earthquake faults, meaning rainwater had gone to that depth in less than 50 years.

State consultants and other independent scientists raised possible volcanic activity near the mountain, earthquake activity, the possibility of spent fuel pooling at the bottom of waste disposal drifts and creating a nuclear criticality, which is a sustained nuclear reaction, and a future threat of major climate changes in the Great Basin.

Scientific studies by both the Energy Department and the Nuclear Regulatory Commission include the potential for volcanic activity, since cinder cones as young as 80,000 years have been found nearby. Under the original rules, the mountain could not become a repository if volcanic activity occurred earlier than 100,000 years. Nye County researchers have also discovered a possible magma field underneath the Yucca Mountain

area, where the Great Basin is being stretched thin. That could allow hot magma to erupt through the repository, releasing radioactivity in a plume. Recent earthquakes have also renewed debate over how vulnerable the site is to a magnitude 6 or higher temblor. The Little Skull Mountain quake, about 12 miles from the repository site, in June 1993 was recorded at 5.6 magnitude.

Congress demanded proof that Yucca Mountain was a workable site, so the DOE produced a viability assessment in 1998, but Congress did not take action. Nuclear utilities began filing lawsuits at that time against the Energy Department for failing to take responsibility for the spent fuel. The NRC, meanwhile, approved dry cask above-ground storage for nuclear utilities when their spent fuel pools became too full. In less than 10 years, the Energy Department figured, nearly every U.S. reactor would require dry cask storage. The Clinton administration had vetoed all congressional attempts to temporarily store the spent fuel at Yucca Mountain and Congress reduced funds for the Yucca Mountain project, even though nuclear ratepayers had contributed $18 billion through a fee that collected one-tenth cent per mil of electricity.

Political Change and Nuclear Politics

Then George W. Bush was elected president.

In February 2002 Energy Secretary Spencer Abraham declared Yucca Mountain safe and suitable as a geologic repository and President Bush accepted the declaration. By law, Nevada was allowed a veto of the site. Gov. Kenny Guinn issued his veto in April 2002, but three months later, Congress overrode the veto and approved Yucca Mountain. Yet the Energy Department is far from receiving a construction license, or a license to

receive spent fuel. There has not been a final design for either transportation casks or containers to bury nuclear waste. It is still not clear whether Yucca Mountain can contain highly radioactive waste for 1 million years or longer.

By law, Energy Department officials had 90 days after congressional approval of Yucca Mountain to submit a construction license application to the NRC, but the department has not done so. Further delay occurred after a July 2004 federal appeals court rejected the EPA's radiation dose for Yucca Mountain, demanding a limit based at or over 1 million years. EPA's earlier standard covered just 10,000 years, despite advice from the National Academy of Sciences to extend environmental protection at the repository.

Possible Fraud Investigated

Further delays occurred in late 2005 when Energy Department officials discovered e-mails between three U.S. Geological Survey scientists contracted to work on Yucca Mountain that indicated computer models, water flow information and scientific review might have been falsified or ignored. The damning e-mails cast scientific work into a shadow of possible fraud. Nevada filed nine lawsuits to stop the project and the department's own inspector general began an investigation. Nevada's congressional delegation also called for an independent investigation of the e-mails. However, the investigations did not result in any penalties or criminal charges.

The Energy Department had also failed to publish within six months the supporting scientific documents on Yucca Mountain to a Web site where all parties involved in the licensing procedure can read them. Even after the Nuclear Regulatory

Commission accepts a licensing application to build a repository, the commission can take up to four years to review and question it, under a courtroom-like atmosphere, and there is no guarantee of its approval. Once the NRC grants a construction license, the Energy Department has to return to the commission to receive permission to place spent fuel in the repository. The state has also sued the NRC over the licensing process and the Energy Department over the siting of a railroad to carry the wastes through Nevada to the mountain and both legal actions could create further delay.

Nevada's Democratic Sen. Harry Reid, Senate minority leader, introduced a bill in December 2005 that would allow the Energy Department to take title to the wastes while they are in dry cask storage. Reid has maintained that the 1987 amendments swung the push for a repository from a scientific process to a political one, putting undue pressure on the Energy Department. Reid has also teamed with Sen. Pete Domenici, R-N.M., who has supported dry cask storage, as well as exploring a new generation of nuclear reactors capable of reprocessing spent nuclear fuel and produce electricity more efficiently.

Cost Estimates Increase

In addition to questionable science and legal problems, as of 2004 the Energy Department had spent more than $8 billion to characterize Yucca Mountain, paid by nuclear power ratepayers and by taxpayers who pay to bury nuclear weapons wastes. By 2004 the nuclear waste fund had collected about $22.5 billion. But the Energy Department estimates that it will cost $60 billion to build and maintain the repository. The department must go to Congress each year and compete for funding with other federal projects.

The Energy Department's Ward Sproat announced in July of 2006 that by the time a license application is submitted to the Nuclear Regulatory Commission for building a nuclear repository at Yucca Mountain, the time the commission will take to review it, and construction, the government could begin accepting spent reactor fuel and high-level nuclear waste by March 31 of 2017.