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Proposed Yucca Mountain Nuclear Dump Should Not Be Built

Poor Science, Safety Problems, Mismanagement Mar Project

The nuclear power industry is touting a nuclear “renaissance” with the goal of building new nuclear reactors in the United States for the first time in 25 years. Indeed, in the recent budget bill, Congress appropriated five times more than was requested for subsidizing license applications for new nuclear reactors. No matter how much money is thrown into propping up nuclear power, though, there is no solution for dealing with one of nuclear power’s most serious side effects: high-level radioactive waste that remains dangerous for hundreds of thousands of years. Despite almost two decades of pushing to make Yucca Mountain the nation’s first nuclear waste dump, this project is no solution to the growing nuclear waste problem.

Not only will Yucca Mountain be too small to store all of the country’s waste, but it has geologic characteristics that could hasten the leakage of the waste, contaminating the drinking water aquifer beneath the site. Further, trucking radioactive waste to the Nevada site will pose serious risks to communities it passes through. Its price tag is skyrocketing, leaping from a 1982 estimate of \$35.2 billion to \$61 billion currently (in 2003 dollars).

The project’s target date for accepting waste, which has been pushed back from 1998 to 2010, remains an unrealistic goal. A crucial first step – the filing of an application for a license to build the facility – is more than two years behind schedule. The U.S. Department of Energy (DOE), which is responsible for building the site, postponed plans to submit its license application to the Nuclear Regulatory Commission (NRC) in December 2004. The DOE has failed to make all of its documentary material related to the application available online to the public, as legally required six months before submitting its license application. Further, a recent court ruling found that the time limit during which radiation in the groundwater at the boundary of the site cannot exceed federal drinking water standards – called the “compliance period,” on which the application is based – is inadequate and illegal. Finally, Congress has appropriated \$577 million to the project for 2005 – 50 percent less than the DOE requested.

Still, the government is pushing ahead with the project, inaccurately claiming it will solve the nation’s nuclear waste problems. This memo outlines the myths about Yucca Mountain and explains why they are false. Building a national repository for high-level nuclear waste at Yucca Mountain is an ill-conceived plan based on poor science. The facts speak for themselves, and they clearly demonstrate that Yucca Mountain should not be built.

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MYTH: Yucca Mountain will consolidate our nuclear waste in one place and therefore make us safer.
FACT: As long as we continue to use nuclear power, nuclear waste cannot be consolidated.

One of the biggest myths perpetuated by the Bush administration is that the Yucca Mountain dump is the “solution” to our nuclear waste problem. With waste in one place, the administration argues, it will no longer be stored at sites throughout the country and be vulnerable to theft and terrorism.

This is wrong. Nuclear waste, which is produced at every operating reactor, must be stored on site for about five years before it can be transported, because it is too radioactive to move. This means that at least five years worth of spent fuel (100-150 metric tons) will always remain at reactors as long as they continue to operate.

Each year, the 103 nuclear reactors in the United States generate about 2,000 metric tons of waste, which most people do not realize will remain extremely radioactive for hundreds of thousands of years. Today, approximately 50,000 metric tons sit at sites around the country, awaiting a permanent storage site. According to the DOE, by the time Yucca Mountain is filled to its legal limit of 70,000 metric tons, approximately 42,000 metric tons of nuclear waste will be stored at 63 sites in 31 states – still almost as much as there is now. *As long as we continue to use nuclear power, it is not possible to consolidate spent fuel.*

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MYTH: Yucca Mountain is the most researched site in the world; thus, it is an ideal spot to store high-level nuclear waste.

FACT: Research has shown that Yucca Mountain is not a safe storage site.

Yucca Mountain is located about 80 miles northwest of Las Vegas, which is the fastest growing metropolitan area in the United States with a population approaching 2 million people. The DOE is proposing to build tunnels to store the highly radioactive waste at 1,000 feet below the very top of the mountain, which is 1,000 feet above the water table.

The ground under the Yucca Mountain site is crisscrossed by 33 fault lines and is nicknamed “Serpent Swimming West” by the Western Shoshone Indian nation due to its constant movement. Nevada ranks third in the nation for current seismic activity. A 1992 earthquake 12 miles from the site registered 5.6 on the Richter scale. Earthquakes could cause the casks in the surface facility, which is slated to hold as much as 40,000 metric tons of spent fuel in vertical dry casks, to break open and release radiation.

Yucca Mountain is made up of thick, 8 to 12 million-year-old ash deposits from a series of nearby volcanic eruptions. The younger volcanic cones in the area were most active 1 million years ago, but the latest activity at the youngest cone is only about 80,000 years old. If the volcanic cones were to become active, magma could enter the underground tunnels and cause the canisters to fail instantaneously, releasing radiation to the groundwater or in the case of a major eruption, to the air as contaminated ash. The DOE, NRC and Nevada geologists are still debating the likelihood and the severity of the radiation dose to the public as a result of volcanic activity. After 20 years, data collection and analyses are still under way on this critical – but unresolved – issue.

Yucca Mountain also sits atop a freshwater aquifer used for irrigation and drinking water by the residents of the Armagosa Valley, an organic farming and dairy community only 20 miles away, as well as parts of California. Given the geology and hydrology at Yucca Mountain, scientists agree that radioactivity eventually will leak from the site and contaminate the aquifer. The question is how quickly. Yucca Mountain is not as dry as initially assumed, and water can travel through the mountain much more rapidly than expected. In fact, radioactive particles from former nuclear bomb tests have found their way through the rock to repository depth after only 50 years, not the thousands of years predicted. This indicates that the site is far less watertight than first thought.

Since the geology of the site is not expected to provide an adequate barrier, the DOE plans to use a nickel-alloy container and a titanium drip shield as the principal “engineered barriers” to contain the waste for thousands of years. Yet Yucca Mountain is an oxidizing environment in which metals could corrode in the presence of moisture. Since the alloy has been in existence only for two decades, the DOE’s models of canister performance are based on inadequate data with large uncertainties.

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MYTH: It is reasonable to declare that 10,000 years is the maximum time during which radiation in the groundwater at the site’s boundary cannot exceed federal drinking water standards.

FACT: Limiting the compliance period to less than the hundreds of thousands of years during which the waste will remain dangerously radioactive threatens the health and safety of future generations.

On July 9, 2004, the U.S. Court of Appeals for the D.C. Circuit ruled that the EPA illegally set its radiation release standards for groundwater at Yucca Mountain. The EPA set 10,000 years as the period during which radiation in the groundwater at the site’s boundary cannot exceed drinking water standards. The court’s decision was based on the 1992 Energy Policy Act, which requires the EPA to set public health and safety standards for the Yucca Mountain waste dump “based upon and consistent with” the National Academy of Sciences’ (NAS) recommendations.

To protect public health and safety, the NAS concluded that the compliance period should extend to the time when the dose to the public is highest. According to DOE projections, the peak dose to an individual from leaking radioactivity would occur at about 300,000 years after closure of the dump. At 300,000 years, it is estimated, the dose will be 37 to 150 times greater than permitted by the EPA’s groundwater protection standard. *Other countries that are investigating sites for a geologic repository, such as Sweden and Canada, have either proposed or established peak dose as the compliance period for public health and environmental laws. Swiss regulations set no “expiration date” on protecting future generations.*

The nuclear industry and some members of Congress are recommending getting around the adverse court ruling by changing the law so the EPA can use the 10,000-year standard. They argue that it is not possible to generate accurate models of events 10,000 years and more in the future. But the NAS, in considering “whether scientifically justifiable analyses of repository behavior over many thousands of years in the future can be made,” concluded that “such analyses are possible.”

The EPA and NRC should be given the necessary time to re-issue standards based on the NAS’ recommendation. Until these two agencies have completed this review, there is no regulatory standard

on which DOE can base the application or that the NRC can use to evaluate it. In the meantime, the DOE should not submit its application.

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MYTH: History shows that transporting high-level radioactive waste is safe.

FACT: Accidents are inevitable; yet the NRC does not require the transport casks to be subjected to full-scale testing as part of its certification process.

Transportation routes to Yucca Mountain, by rail, road and barge, would pass through as many as 44 states and the District of Columbia, putting the dangerous waste within half a mile of 50 million people. The nuclear industry often touts its good record on nuclear transport, but since the dawn of the nuclear age 50 years ago, there have been just 3,025 high-level waste shipments in the United States. In the past decade, there have been only a few shipments involving relatively small amounts of irradiated fuel over very short distances. The magnitude and duration of this proposal to transport 70,000 metric tons of the country's spent fuel and high-level radioactive waste to one national site is outside the current realm of experience. More waste would be shipped in the first year alone than has been shipped in the United States in the past three decades.

Under the plan the DOE has selected, more than 22,000 shipments would be made by rail and truck, and almost 3,000 shipments would be made by barge over 38 years, averaging about 658 shipments per year. At sites that do not have rail access, the DOE plans to ship thousands of casks by barge through densely populated cities, including Boston, Baltimore, Newark and Miami. According to Nevada's Agency for Nuclear Projects, as many as 390 accidents and 2,400 regulatory violations can be expected as a result of these shipments.

While the nuclear industry often points to international transport as a model the United States can copy, nuclear waste transportation internationally has a tarnished history. For instance, it was revealed in 1997 that 26 percent of the French transport casks were contaminated 50 times above the regulatory dose limits on their exterior surface. Such contamination incidents also took place with United Kingdom, German and Swiss shipments. As a result, shipments between France and Germany were halted for three years, from 1998 to 2001.

In addition to accident risks, transporting high-level nuclear waste across the country through highly populated areas poses a security risk. DOE and NRC testing has found that truck casks are vulnerable to sophisticated antitank weapons and high-energy explosive devices, which can breach the wall of the cask. But, as the "backpack" bombings in Madrid last March show, it does not take a sophisticated missile to successfully attack a train or train tracks.

Ultimately, the robustness of the shipping casks will determine whether radioactivity is released when there is an accident, crash or attack. Yet amazingly, the NRC does not require full-scale testing as part of its certification process. None of the casks that are used for the few nuclear waste shipments made in the United States have undergone full-scale testing. And there are no plans for full-scale testing of all of the designs of casks that could be used for waste shipments to Yucca Mountain.

The DOE estimates that it will cost \$1 billion to build a rail line from Caliente, Nevada, located on the east edge of the state, to Yucca Mountain for the transport of waste within Nevada. Waste

would be shipped by rail to Caliente from across the country. Due to high traffic along northern lines and bad weather in the winter in the Rocky Mountains and Great Plains, rail carriers, who determine the transport routes, may find routing the waste along southern rail lines more attractive. Thus more waste would travel across Texas, New Mexico, Arizona and California, and more than 80 percent of shipments would go through Las Vegas on its way to Caliente. Further, the DOE is considering using truck casks to transport waste on railcars, because the Caliente tracks will not be completed by the time the DOE wants to start shipping waste in 2010. It is telling that the DOE originally dismissed this option in its Final Environmental Impact Statement as too costly and too risky for workers and the public.

In a Dec. 1 letter to the DOE, the Nuclear Waste Technical Review Board (NWTRB), the government-appointed oversight panel for the Yucca Mountain Project, said that the DOE does not have a “detailed strategic plan” for transporting waste to the site or an “overarching implementation organization that can develop a safe, secure and efficient transportation system.” The board also expressed concerns that the emergency-response planning “appears to be based too much on funding formulas and not enough on the underlying objective of ensuring that adequate emergency-response capability exists along all selected routes.”

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MYTH: We need to open Yucca Mountain to advance nuclear power, which will decrease our dependence on foreign oil.

FACT: Nuclear power cannot rescue us from our dependence on foreign oil.

Oil provides only 1.4 percent of the electricity produced in the United States, according to the federal Energy Information Administration. Two-thirds of the oil consumed in the United States is used for transportation. While nuclear power could theoretically be used to generate hydrogen, which may someday power vehicles, many technological hurdles remain to implementing the hydrogen economy on a large scale, including appropriate methods of hydrogen storage, delivery and efficient generation.

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MYTH: Yucca Mountain provides good jobs to the people of Nevada.

FACT: The DOE and its contractors, while fully aware of the high carcinogenic dust levels caused by tunnel drilling at Yucca Mountain, failed to provide adequate safety equipment and concealed the health hazards from workers and visitors at the site.

The DOE and its contractors failed to warn or protect workers at the Yucca Mountain site about the health risks from inhaling carcinogenic compounds, such as silica and erionite, in the dust caused by excavation and drilling, the majority of which took place between 1992 and 2000, although dangerous levels of silica were found in some areas of the site in 2002. Thus far, at least three Yucca Mountain workers have been diagnosed with silicosis, a chronic lung disease caused by the inhalation of silica, and one has died. Exposure to erionite, which is as much as 100 times more carcinogenic than asbestos, causes fibrosis and cancer. As many as 1,500 workers, in addition to thousands of visitors to the site, were exposed to these carcinogens during excavation.

In March 2004, former workers and frequent visitors to Yucca Mountain filed a class action lawsuit against 12 DOE contractors for their blatant and intentional disregard of the need for protection from the dangerous levels of hazardous dust in the tunnels.

E-mails and memos released in July 2004 reveal the DOE and its contractors were obsessed with keeping the Yucca Mountain Project on schedule and lied to workers about the project's health risks to save time and money. The DOE's disregard of its workers' health is indicative of a larger pattern by the DOE of pushing projects forward regardless of the human costs.

Conclusion

Despite all the issues plaguing the Yucca Mountain project, politics has trumped science at nearly every step, as the nuclear industry continues to heavily lobby Congress to build the dump. The current *de facto* solution for our nuclear waste problem, while the Yucca Mountain project continues on life-support, is to leave the waste in vulnerable spent fuel pools at each site. It is time to send the Yucca Mountain project to its grave and to focus on making on-site storage safer, while we seek a real long-term solution for the existing waste and turn to renewable energy sources for the future.

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*Public Citizen is a national, nonprofit consumer advocacy organization based in Washington, D.C.
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