

April 2011

COMMERCIAL NUCLEAR WASTE

Effects of a Termination of the Yucca Mountain Repository Program and Lessons Learned



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Why GAO Did This Study

Spent nuclear fuel—considered very hazardous—is accumulating at commercial reactor sites in 33 states. The Nuclear Waste Policy Act of 1982, as amended, directs the Department of Energy (DOE) to dispose of this waste in a repository at Yucca Mountain, Nevada. In June 2008, DOE submitted a license application for the repository, but in March 2010 moved to withdraw it. However, the Nuclear Regulatory Commission (NRC) or the courts—as a result of lawsuits—could compel DOE to resume the licensing process.

This report examines (1) the basis for DOE's decision to terminate the Yucca Mountain program, (2) the termination steps DOE has taken and their effects, (3) the major impacts if the repository were terminated, and (4) the principal lessons learned. GAO reviewed documents and interviewed knowledgeable parties.

What GAO Recommends

GAO suggests that Congress consider whether a more predictable funding mechanism would enhance future efforts and whether an independent organization would be more effective. GAO also recommends that DOE assess remaining risks of the shutdown; create a plan to resume licensing if necessary; and report on federal property and its disposition. NRC concurred with the facts in a draft of this report, but DOE strongly disagreed with the draft and the recommendations, questioning the veracity of GAO's information. GAO continues to believe its findings and recommendations are sound.

View [GAO-11-229](#) or key components. For more information, contact Mark Gaffigan at (202) 512-3841 or gaffiganm@gao.gov.

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What GAO Found

DOE decided to terminate the Yucca Mountain repository program because, according to DOE officials, it is not a workable option and there are better solutions that can achieve a broader national consensus. DOE did not cite technical or safety issues. DOE also did not identify alternatives, but it did create a Blue Ribbon Commission to evaluate and recommend alternatives.

Amid uncertainties about the status of the repository license, DOE took an ambitious set of steps to dismantle the Yucca Mountain program by September 30, 2010. DOE has taken steps to preserve scientific and other data, eliminated the jobs of all federal employees working on the program, and terminated program activities by contractors. DOE also disposed of property from its Las Vegas offices by declaring the property abandoned. This procedure saved DOE time and costs, according to officials. However, DOE's documentation for this process was limited, given the variety and volume of property disposed of. In addition, DOE did not finalize a plan for the shutdown, nor did it identify or assess risks of the shutdown. Both steps are required under federal internal control standards and DOE orders. Some of DOE's shutdown steps would likely hinder progress, should NRC or the courts require DOE to resume the license application review process.

Terminating the Yucca Mountain repository program could bring benefits, such as allowing DOE to search for a more acceptable alternative, which could help avoid the costly delays experienced by Yucca Mountain. However, there is no guarantee that a more acceptable or less costly alternative will be identified; termination could instead restart a costly and time-consuming process to find and develop an alternative permanent solution. It would also likely prolong the need for interim storage of spent nuclear fuel at reactor sites, which would have financial and other impacts. For example, the federal government bears part of the storage costs as a result of industry lawsuits over DOE's failure to take custody of commercial spent nuclear fuel in 1998, as required. These costs exceed \$15.4 billion and could grow by an additional \$500 million a year after 2020.

Published reports and our interviews—with federal, state, and local government officials and representatives of various national organizations—suggest two broad lessons for developing a future waste management strategy. First, social and political opposition to a permanent repository, not technical issues, is the key obstacle. Important tools for overcoming such opposition include transparency, economic incentives, and education. Second, it is important that a waste management strategy have consistent policy, funding, and leadership, especially since the process will likely take decades. Some federal and other stakeholders suggested that a more predictable funding mechanism and an independent organization may be better suited than DOE to overseeing nuclear waste management.

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Abbreviations

DOE	Department of Energy
EPA	Environmental Protection Agency
GSA	General Services Administration
NRC	Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act of 1982
OCRWM	Office of Civilian Radioactive Waste Management
WIPP	Waste Isolation Pilot Plant

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United States Government Accountability Office
Washington, DC 20548

April 8, 2011

The Honorable Fred Upton
Chairman
The Honorable Joe Barton
Chairman Emeritus
Committee on Energy and Commerce
House of Representatives

The Honorable Cliff Stearns
Chairman
Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

The Honorable Greg Walden
House of Representatives

Nuclear energy, which supplied about 20 percent of the nation's electric power in 2010, offers a domestic source of energy with low emissions but also presents difficulties—including what to do with nuclear fuel after it has been used and removed from commercial power reactors. This material, known as spent nuclear fuel, is highly radioactive and considered one of the most hazardous substances on earth.¹ The current national inventory of nearly 65,000 metric tons of commercial spent nuclear fuel is stored at 75 sites in 33 states and increases by about 2,000 metric tons each year.

¹Spent (or used) nuclear fuel is no longer efficient in generating power in a nuclear reactor. It is potentially a resource, since parts of it can be reprocessed to separate out uranium and plutonium so that they can be used as fuel again in a reactor. Reprocessing, however, still results in nuclear waste residues that require disposal. The United States does not reprocess its spent nuclear fuel, and this fuel, when it is accepted for disposal, is considered to be high-level waste as defined by the Nuclear Regulatory Commission, the regulating agency.

Since the publication of a 1957 report by the National Academy of Sciences,² a geologic repository has been considered the safest and most secure method of isolating spent nuclear fuel and other types of nuclear waste from humans and the environment. In 1983, the President signed the Nuclear Waste Policy Act of 1982 (NWPA), which directed the Department of Energy (DOE) to investigate sites for a federal deep geologic repository to dispose of spent nuclear fuel and high-level nuclear waste.³ DOE studied six sites in the West and three sites in the South, and by 1986, DOE recommended three candidate sites for site characterization: Hanford in Washington state, Deaf Smith County in Texas, and Yucca Mountain in Nevada. In 1987, however, Congress amended the act to direct DOE to focus its efforts only on Yucca Mountain—a site about 100 miles northwest of Las Vegas. Under this amendment, DOE was to perform studies to determine if the site was suitable for a repository and make a site recommendation to the President if it met certain requirements. DOE was also authorized to contract with commercial nuclear reactor operators to take custody of their spent nuclear fuel for disposal at the repository beginning in January 1998. Ultimately DOE was unable to meet this 1998 date because of a series of delays due to, among other things, state and local opposition to the construction of a permanent nuclear waste repository in Nevada and technical complexities.⁴ DOE issued a viability assessment in 1998 that stated Yucca Mountain was still a viable alternative and, in 2002, recommended the site to the President. In turn, the President recommended the site to Congress, which subsequently approved the Yucca Mountain site as the location for the nation’s geologic repository.

²National Academy of Sciences, *The Disposal of Radioactive Waste on Land* (Washington, D.C.: September 1957). This report suggested several potential alternatives for disposal of nuclear waste, including spent nuclear fuel, stressing that there are many potential sites for geologic disposal of waste at various depths and in various geologic formations. Subsequent reports by the National Academy of Sciences and others have continued to endorse geologic isolation of nuclear waste and have suggested that engineered barriers, such as corrosion-resistant containers, can provide additional layers of protection to such sites. International consensus also supports geologic disposal.

³DOE manages about 13,000 metric tons of spent nuclear fuel as well as other high-level waste—primarily generated by the nation’s nuclear weapons program. We issued a separate report on the impacts of terminating Yucca Mountain on the spent nuclear fuel and high-level waste managed by DOE. See *DOE Nuclear Waste: Better Information Needed on Waste Storage at DOE Sites as a Result of the Yucca Mountain Shutdown*, [GAO-11-230](#) (Washington, D.C.: Mar. 23, 2011).

⁴Some technical complexities, such as DOE’s assessment of how heat from the spent nuclear fuel might impact the performance of the repository, became the focus of years of scientific inquiry.

In June 2008, DOE submitted a license application to the Nuclear Regulatory Commission (NRC) seeking authorization to construct a high-level waste repository at Yucca Mountain. NRC has regulatory authority to authorize construction of the repository, as well as operations and closure of a repository, which are separate licensing actions. In the application, DOE planned to open the repository in 2017, but later delayed the date to 2020. In March 2009, however, the Secretary of Energy announced plans to terminate the Yucca Mountain repository program and instead study other options for nuclear waste management. The President's fiscal year 2011 budget proposal, released in February 2010, proposed eliminating all funding for the Yucca Mountain repository program and the DOE office responsible for nuclear waste management—the Office of Civilian Radioactive Waste Management (OCRWM). At about the same time, the administration also directed DOE to establish a Blue Ribbon Commission of recognized experts to study nuclear waste management alternatives. The commission is scheduled to issue a report by January 2012.

On March 3, 2010, DOE submitted a motion to the NRC's Atomic Safety and Licensing Board to withdraw its license application with prejudice, a term described by DOE to mean the Yucca Mountain site would be excluded from further consideration as a repository site. On June 29, 2010, the licensing board denied DOE's motion, ruling that DOE was obligated under NWPAA to continue with the licensing effort. The board noted that, even if it approved the license application, there was no guarantee the Yucca Mountain repository would ever be constructed for any number of reasons, including congressional action changing the law or a decision by Congress not to fund the proposed repository. In the meantime, DOE took steps to dismantle OCRWM and the Yucca Mountain repository program by the end of September 2010. In response to DOE's attempt to withdraw the license application, several states and parties sued DOE and NRC, arguing that DOE had no authority to terminate the proposed Yucca Mountain repository.⁵

In this context, you asked us to review the termination of the repository. Our objectives were to determine (1) the basis for DOE's decision to terminate the Yucca Mountain repository program; (2) the steps DOE has

⁵The parties include the states of Washington and South Carolina; Aiken County, South Carolina; and individuals from the state of Washington. DOE's Hanford Site and one commercial nuclear power reactor are located in Washington, DOE's Savannah River Site and four commercial nuclear power reactors are located in South Carolina, and the Savannah River Site is located in Aiken County.

taken to terminate the Yucca Mountain repository program and the effects, if any, of these steps; (3) the likely major impacts if the Yucca Mountain repository program were to be terminated; and (4) the principal lessons that can be learned from the various past nuclear waste management efforts and how these might be applied to future efforts.

To answer these objectives, we reviewed pertinent DOE documents; analyzed both our and other agencies' reports on nuclear waste management; and interviewed federal, state, local, industry and other knowledgeable officials. For more information on our methodology, see appendix I. Specifically, to determine the basis for DOE's decision to terminate the Yucca Mountain repository program, we contacted the Secretary of Energy by letter requesting his views. To determine the steps DOE has taken to terminate the Yucca Mountain repository program and the effects, if any, of these steps. We reviewed DOE documents and spoke with DOE federal and contractor officials from various offices involved with the termination efforts, including OCRWM, the Office of Nuclear Energy, the Office of Environmental Management, the Office of Legacy Management, and the Office of General Counsel. We also reviewed pertinent DOE Office of Inspector General reports related to Yucca Mountain and the termination efforts. To evaluate the likely major impacts of terminating the Yucca Mountain repository program and the principal lessons that can be learned, we conducted analysis of our work and that of other agencies within the legislative branch⁶ on issues related to siting and building a permanent geological repository for nuclear waste (see app. II). We focused on the likely impacts of termination on commercial spent nuclear fuel. We are preparing a separate report on the impacts of termination on waste that is in the custody of DOE—mostly high-level waste that is a by-product of nuclear weapons production.⁷ We also spoke with a variety of stakeholders including industry representatives, state and local officials, community leaders, and others (see app. III). Specifically, we spoke with representatives from key national associations and organizations whose members were either affected by the termination of the Yucca Mountain repository program or were in a position to comment on the impact as a

⁶These reports were written by GAO, the Congressional Budget Office, the Congressional Research Service, and the Office of Technology Assessment, which is no longer in existence.

⁷NRC considers high-level radioactive wastes to be the highly radioactive materials produced as a byproduct of the reactions that occur inside nuclear reactors. High-level wastes take one of two forms: (1) spent nuclear fuel when it is accepted for disposal and (2) waste materials remaining after spent fuel is reprocessed.

result of studies or analyses. To gain a local perspective of the possible impacts of a Yucca Mountain repository program termination and any lessons that could be learned, we also contacted communities near the proposed Yucca Mountain site and the Waste Isolation Pilot Plant (WIPP) in New Mexico—the nation’s only federal geologic repository for radioactive waste.⁸ We also selected a nongeneralizable sample of nuclear power reactors—three operational reactors, one reactor that is no longer operating, and one decommissioned reactor. The reactor sites were located in Illinois, Minnesota, New Jersey, Oregon, and Tennessee. We interviewed stakeholders including state and local government officials, industry representatives, and local community groups.

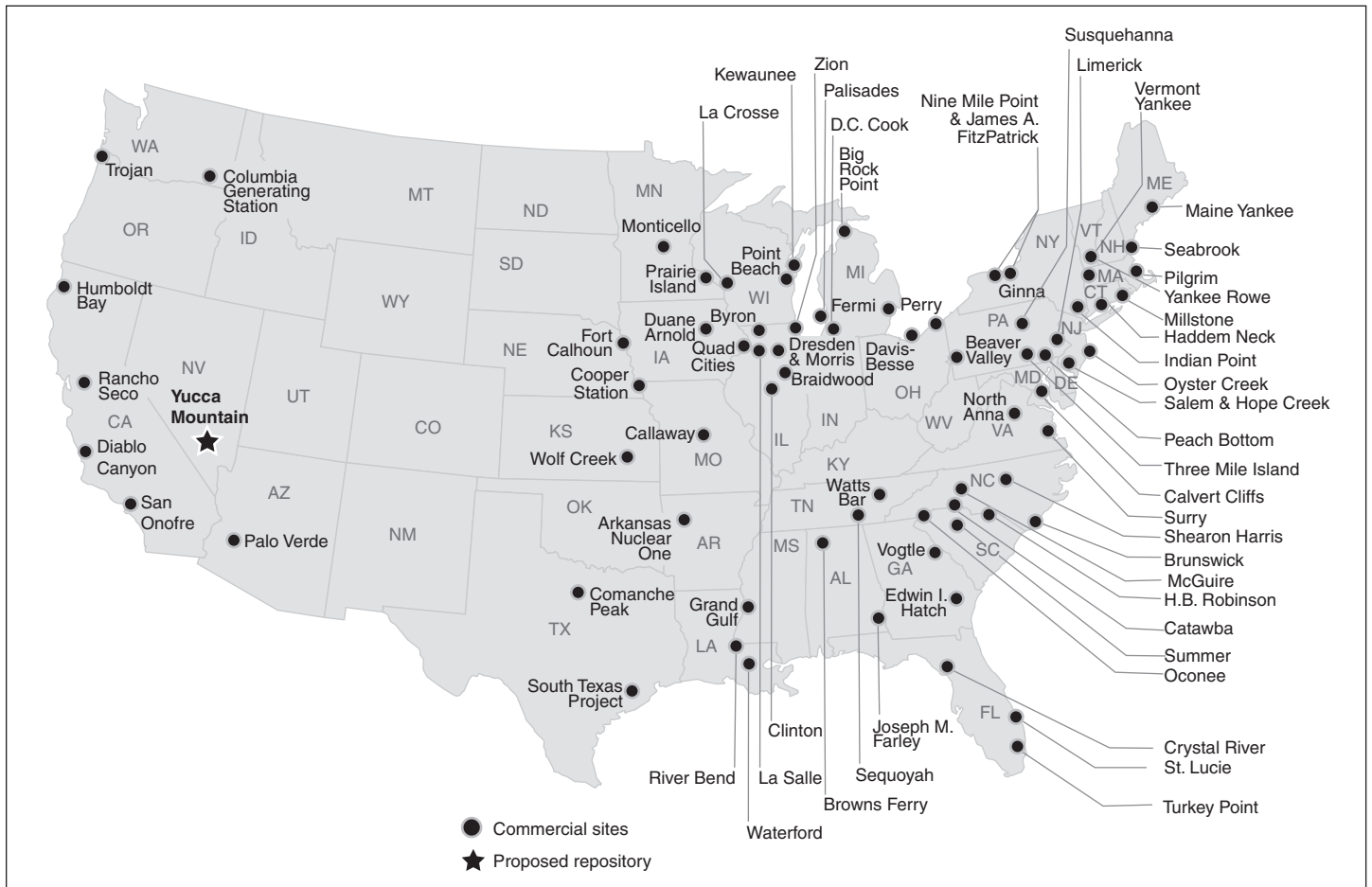
We conducted this performance audit from January 2010 to March 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient and appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

⁸WIPP was designed to accept transuranic waste, not spent nuclear fuel. Generally, transuranic waste consists of clothing, tools, rags, residues, debris, soil, and other items contaminated with radioactive elements heavier than uranium, mostly plutonium, as a result of work related to the defense industry.

Background

Spent nuclear fuel is considered one of the most hazardous substances on earth. Without protective shielding, its intense radioactivity can kill a person exposed directly to it within minutes or cause cancer in those who receive smaller doses. Although some elements of spent nuclear fuel cool and decay quickly, becoming less radiologically dangerous, others remain dangerous to human health and the environment for tens of thousands of years. The nation's inventory of over 65,000 metric tons of commercial spent nuclear fuel—enough to fill a football field nearly 15 feet deep—consists mostly of spent nuclear fuel removed from commercial power reactors. The volume of commercial spent nuclear fuel is expected to more than double by 2055—assuming currently operating reactors receive license extensions and no new reactors are built—and is currently accumulating at 75 sites in 33 states (see fig. 1).

Figure 1: Current Storage Sites for Commercial Spent Nuclear Fuel and Proposed Yucca Mountain Repository Site



Source: DOE.

Note: Locations are approximate. DOE has reported that it is responsible for managing nuclear waste at 121 sites in 39 states, but this includes high-level waste and spent nuclear fuel at 5 sites managed by DOE—2 of which are licensed by NRC and contain commercial spent nuclear fuel, at Fort St. Vrain in Colorado and the Idaho National Laboratory—and several sites that have only research reactors that generate small amounts of waste that will be consolidated at the Idaho National Laboratory for packaging prior to disposal.

Operators of commercial nuclear power facilities must actively manage the spent nuclear fuel—consisting of thumbnail size pellets filling 12- to 14-foot rods bound together in assemblies—by isolating and continually monitoring it to keep humans and the environment safe. Most spent nuclear fuel is stored at operating reactor sites, immersed in pools of water designed to cool and isolate it from the environment. With nowhere to move the spent nuclear fuel, the racks in the pools holding spent fuel

have been rearranged to allow for more dense storage of assemblies. Even with this re-racking, spent nuclear fuel pools are reaching their capacities. Some critics have expressed concern about the remote possibility of an overcrowded spent nuclear fuel pool releasing large amounts of radiation if an accident or other event caused the pool to lose water, potentially leading to a fire that could disperse radioactive material. As reactor operators have run out of space in their spent nuclear fuel pools, they have turned in increasing number to dry cask storage systems that generally consist of stainless steel canisters placed inside larger stainless steel or concrete casks (see fig. 2). To protect humans and the environment, NRC—which regulates commercial nuclear power plants—requires protective shielding, routine inspections and monitoring, and security systems to isolate the spent nuclear fuel.

Figure 2: Spent Nuclear Fuel Stored in Dry Casks at the Trojan Independent Fuel Storage Installation in Oregon



Source: Portland General Electric Co.

Progress toward developing a geologic repository was slow until NWPA was enacted. Since the 1950s, prior to operation of the first U.S. commercially licensed nuclear power plant, the government recognized

the need to manage the back end of the fuel cycle—specifically, what to do with the spent nuclear fuel. A 1957 National Academy of Sciences report endorsed deep geological formations to isolate spent nuclear fuel, but during the 1950s and 1960s waste management received relatively little attention from policymakers. The early regulators and developers of nuclear power viewed waste disposal primarily as a technical problem that could be solved when necessary by application of existing technology. Attempts were made to reprocess the spent nuclear fuel, but they were not successful because of economic issues and concerns that reprocessed nuclear materials raise proliferation risks. The Atomic Energy Commission attempted to develop high-level waste repositories in Kansas and New Mexico in the late 1960s and early 1970s, but neither succeeded because of local community and state opposition. Citing the potential risks of the accumulating amounts of spent nuclear fuel, the NWPA’s purpose is, among other things, to establish the federal responsibility, and a definite federal policy, for the disposal of high-level waste and spent nuclear fuel.⁹ The act required DOE to evaluate a permanent geologic repository to protect public health and safety and the environment for current and future generations. DOE, its national laboratories, and contractors have all worked together on this project.

DOE’s June 2008 submission seeking a construction authorization for a repository at Yucca Mountain initiated two concurrent review processes at NRC. The first process is the technical licensing review by NRC staff, to assess the merits of the repository design and formulate a position on whether to issue a construction authorization for the repository. The second process consists of hearings before one or more of NRC’s Atomic Safety and Licensing Boards, to hear challenges by participants on technical and legal aspects of DOE’s application. Based on the results of the licensing review and the hearings, NRC will determine whether to authorize construction of the Yucca Mountain repository. If construction of the Yucca Mountain repository were to be authorized, DOE would have

⁹In addition to spent nuclear fuel and defense-generated high-level waste, the nation also generates so-called greater than class C waste from the maintenance and decommissioning of nuclear power plants; from radioactive materials that were once used for food irradiation or for medical purposes; and from miscellaneous radioactive waste, such as contaminated equipment from industrial research and development. Under section 3(b)(1)(D) of the Low Level Radioactive Waste Policy Act, DOE is responsible for disposing of greater than class C waste. DOE had considered Yucca Mountain as a disposal option at one time, but is now evaluating its disposal options. Greater than class C waste is currently stored at commercial reactor sites throughout the country—including at decommissioned reactors—along with spent nuclear fuel.

to update a separate application requesting authorization to receive and possess high-level waste at Yucca Mountain, before DOE could begin operations. This application would also be subject to the technical review and hearing processes.

Since 1983, DOE has spent nearly \$15 billion¹⁰ to evaluate potential nuclear waste repository sites, evaluate the Yucca Mountain site in more depth, and develop and submit the license application for it. About 65 percent of this expenditure, or about \$9.5 billion, came from the Nuclear Waste Fund, established under NWPA to pay industry's share of the cost for the Yucca Mountain repository and funded by a fee of one-tenth of a cent per kilowatt-hour of nuclear-generated electricity. The federal government collects this fee from electric power companies, and the fund balance is currently estimated at about \$25 billion.¹¹ The approximately \$5 billion in additional costs for repository development activities came from other congressional appropriations. This does not include an estimated \$956 million already paid by taxpayers from the U.S. Treasury's judgment fund, resulting from 74 industry lawsuits, in which courts have ordered the government to compensate utilities for not accepting spent nuclear fuel starting in 1998, as required under NWPA. In addition to these liabilities, according to the Department of Justice, it has incurred costs of about \$168 million as of the end of fiscal year 2010, to defend DOE in litigation. Industry officials said that, for proprietary reasons, they could not provide a total for their litigation costs, but that they are also incurring expenses.

With the future of a permanent repository unclear, spent nuclear fuel may remain at commercial nuclear reactor sites for an extended period. NRC has stated that, as a matter of policy, it will not license reactors if it does not have reasonable confidence that the wastes can be disposed of safely. Regulators have stated that the spent nuclear fuel, if properly stored and monitored, can be kept safe and secure on-site for decades. In December 2010, NRC published an update to its Waste Confidence Decision and Rule, first issued in 1984, and updated in 1990.¹² A key premise of the update is that spent nuclear fuel can be safely stored for at least 60 years—rather than the 30 years specified in the 1990 update—beyond the licensed life of a commercial power reactor, including license extensions. This would give

¹⁰All amounts are in constant fiscal year 2010 dollars, unless otherwise noted.

¹¹Nominal dollars.

¹²75 Fed. Reg. 81,037 (Dec. 23, 2010).

most reactors about 120 years of safe storage.¹³ NRC officials consider these storage measures interim, however, and stated that a deep geologic repository is necessary for the ultimate disposal of the spent nuclear fuel. Currently, NRC, as well as DOE and industry, are working to study the safety and security impacts of prolonged storage of spent nuclear fuel, but the results of their studies will not be known for several years.

In the meantime, DOE has established the Blue Ribbon Commission on America's Nuclear Future, which has been tasked to evaluate existing fuel cycle technologies, options for prolonged storage of spent nuclear fuel, permanent disposal options, and other options involving the full nuclear fuel cycle, including reprocessing. The commission comprises three subcommittees: Disposal, Reactor Fuel Cycle Technology, and Transportation and Storage, all of which have been holding hearings with experts around the country. It has not been charged with choosing or recommending facility sites, including a site for a potential permanent repository. The commission is scheduled to issue a report by January 2012.

The Basis for DOE's Decision to Terminate the Yucca Mountain Repository Program

DOE's decision to terminate the Yucca Mountain repository program was made for policy reasons, not technical or safety reasons.¹⁴ In a June 2010 letter to us, the Acting Principal Deputy Director of OCRWM, responding on behalf of the Secretary, stated that the Secretary's decision was based on a proposed change of department policy for managing spent nuclear fuel. He did not, however, cite any technical concerns or safety issues related to the Yucca Mountain repository. The Acting Principal Deputy Director explained that the Secretary believes there are better solutions that can achieve a broader national consensus to the nation's spent fuel and nuclear waste storage needs than Yucca Mountain, although he did not cite any. He went on to say that the Secretary has repeatedly stated his conclusions that Yucca Mountain has not proven to be a workable option for a permanent repository for high-level waste and spent nuclear fuel and that the technical and scientific context is significantly different today than it was at the time of the 1983 enactment of the NWPA.

¹³The states of Connecticut, New York, and Vermont have sued the NRC in federal court regarding this waste confidence rule, arguing that NRC should have performed an environmental review of the impact of extending on-site storage before making a decision. Several environmental groups have filed similar lawsuits.

¹⁴DOE characterized its motion to withdraw its license application as an interim step toward a final decision, not a decision that might be considered a final agency action for the purposes of the Administrative Procedures Act.

DOE also filed a reply before NRC's Atomic Safety and Licensing Board, which provided additional information about the reasoning for attempting to withdraw its license application. Specifically, the reply explained that "the Secretary's judgment is not that Yucca Mountain is unsafe or that there are flaws in the license application, but rather that it is not a workable option and that alternatives will better serve the public interest."

DOE established a Blue Ribbon Commission to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle, including alternatives for the storage, processing, and disposal of spent nuclear fuel, high-level waste, and materials derived from nuclear activities. The commission, however, is not to evaluate individual sites for a repository, including Yucca Mountain, a position made clear by the Secretary of Energy in public statements.¹⁵ Industry representatives we spoke with, however, stated that even with a change in policy, a geologic repository or some other disposal pathway will eventually be needed for the permanent disposal of spent nuclear fuel and other nuclear waste. For example, even if the nation decides to reprocess spent nuclear fuel, the high-level waste residues from the process will still need to be disposed of.¹⁶ Furthermore, DOE stated that public acceptance is a key component of a workable effort to build a permanent repository and that acceptance is lacking from the people of Nevada. Over the past several decades, however, no states have expressed an interest in hosting a permanent repository for this spent nuclear fuel and other types of nuclear waste, including the states with sites currently storing the waste.

NRC officials stated that no new technical or safety issues related to the Yucca Mountain repository had been reported to them since DOE submitted its license application in 2008. In its June 29, 2010, ruling on DOE's motion to withdraw its license application, NRC's Atomic Safety and Licensing Board stated that the NWPA provided the Secretary of Energy with an opportunity to report any reasons that the Yucca Mountain site was not suitable prior to submitting its license application, but DOE reported no such issues. According to the board, the NWPA required DOE to submit a license application and NRC to rule on its merits by approving

¹⁵Secretary Chu reiterated this position in a February 11, 2011, letter to the Blue Ribbon Commission.

¹⁶Reprocessing is the chemical treatment of used nuclear fuel to separate out plutonium and uranium that can be used again as fuel, but which leaves a highly radioactive liquid that is referred to as high-level waste.

or disapproving the issuance of a construction authorization, the first authorization required in the license application process.¹⁷ Many DOE and NRC officials, scientists, and industry representatives we spoke with told us that completing the license review process and obtaining NRC findings on the technical merits of the license application would provide valuable information that could be applied to future efforts, even if Yucca Mountain was not pursued as a repository. Additionally, the board stated that, even if approved, such approval did not ensure that a repository would be built or become operational for any number of reasons, including separate congressional action changing the law or a decision by Congress not to fund the proposed repository.

As of February 2011, the status of the Yucca Mountain license application and associated review process is uncertain. On June 30, 2010, the day after the Atomic Safety and Licensing Board denied DOE's motion to withdraw its license application with prejudice, the NRC commissioners issued an order inviting parties—including the state of Nevada, local counties, and industry—to file briefs addressing whether the commissioners should review the board's decision and, if so, whether they should uphold or reverse it. As of March 4, 2011, however, the commissioners have yet to announce whether they plan to review the board's decision. In a separate action, the United States District Court of the District of Columbia that is hearing the lawsuits against DOE decided to stay its proceedings until the NRC commissioners ruled on the board's decision. Absent any action from the NRC commissioners, however, the plaintiffs in the lawsuits have asked the federal court to expedite the hearings to prevent DOE from shutting down the Yucca Mountain repository program. The court granted the request on December 10, 2010, and later scheduled oral arguments to begin on March 22, 2011. The Atomic Safety and Licensing Board, with no further input from the NRC commissioners or federal courts, announced its intention to continue with its consideration of the challenges to the license application. In these proceedings, the Board will consider approximately 300 contentions submitted by stakeholders questioning certain aspects of DOE's license application and related participant filings

¹⁷The license application process involves three phases. In the second phase, NRC must review DOE's submission to update its license application to receive and possess high-level radioactive waste. If authorized, DOE would be able to begin operations. The third phase occurs upon conclusion of operations when DOE must request an amendment to the license application to permanently close the repository. At each phase, NRC is to ensure that DOE meets certain regulatory requirements.

and evidence. It is not yet clear whether NRC or the courts will rule that the license application review process should resume.

Steps DOE Has Taken to Terminate the Yucca Mountain Repository Program and Their Effects

DOE undertook an ambitious set of steps to dismantle the Yucca Mountain repository program. However, concerns have been raised about DOE's expedited procedures for disposing of property from the program, and its documentation of these procedures was limited. In addition, DOE did not consistently follow federal policy and guidance for planning or assessing risks of the shutdown. Some of these steps to dismantle the program will likely hinder progress if the license application review process resumes—should NRC or the courts require it.

DOE Took Steps to Terminate the Repository Program

Amid a backdrop of uncertainty concerning the status and future of the Yucca Mountain repository license review process, DOE undertook an ambitious schedule to terminate the repository program and dismantle OCRWM and the Yucca Mountain repository program by September 30, 2010, when funding would have ended under the President's budget proposal. Starting in February 2010, DOE redirected the remaining fiscal year 2010 OCRWM budget to fund closeout activities; hired a contractor to archive project documents, such as those supporting the license application; eliminated the jobs of all federal employees working on the project; terminated project activities carried out by contractors, including national laboratory scientists; terminated leases for office space; transferred dozens of truckloads of office equipment and computers to other DOE facilities and local schools; and closed most of its 500 contracts and subcontracts.¹⁸ DOE officials told us that DOE met its September 30, 2010, deadline for closure and believed that despite the difficult task, the shutdown was orderly. However, while OCRWM's Yucca Mountain project activities have ceased, several termination tasks are still ongoing, such as

¹⁸DOE stated that, as of December 2010, it had closed over 400 of the contracts and subcontracts, but that the DOE Inspector General has identified at least \$175 million in prior-year costs that still need to be resolved and stated that DOE needs to ensure that the closeout process is managed effectively and that all disallowed costs are settled and funds recouped. (See: Office of the Inspector General for DOE, *Special Report: Resolution of Questioned, Unresolved, and Potentially Unallowable Costs Incurred in Support of the Yucca Mountain Project* (Washington, D.C.: July 2010)). In addition, DOE identified at least \$9.4 million in costs for close-out activities since September 30, 2010, which includes \$8.6 million in employee benefits. Although activities for key contracts were terminated, the contracts themselves are still in place, in part, to ensure that certain benefits—such as pensions—are continued.

disposing of federal property and closing down contracts and subcontracts. These tasks have been divided among various DOE programs, including the National Nuclear Security Administration, the Office of Environmental Management, the Office of Legacy Management, the Office of Nuclear Energy, and the Office of General Counsel.

DOE has undertaken extensive efforts to preserve data related to its licensing efforts, as well as other scientific information relevant to the storage or disposal of high-level waste and spent nuclear fuel. The Federal Records Act requires the heads of federal agencies to preserve certain data and gives authority to the National Archives and Records Administration to determine which types of documents should be archived. DOE stated that, consistent with the Federal Records Act, it is preserving millions of documents related to the licensing effort at Yucca Mountain, as well as scientific information related to the storage and disposal of high-level waste and spent nuclear fuel. First, DOE has been maintaining a collection of 3.6 million documents pertaining to its license application in its Licensing Support Network Collection, a database of key licensing documents accessible through NRC's Web site. NRC's Atomic Safety and Licensing Board recently highlighted the importance of preserving those documents, and DOE officials stated that they were committed to preserving them. A DOE official in charge of managing DOE's Licensing Support Network collection stated that DOE plans on maintaining it through the NRC's Web site until the courts have resolved the issues surrounding DOE's motion to withdraw its license application, then for 100 years after that. It is not clear, however, who will be responsible for preserving the Licensing Support Network or whether it will continue to be accessible by scientists and the public, particularly in light of budget pressures and changing priorities that may occur over the next century. A February 18, 2011, memo from NRC's Licensing Support Network Administrator to members of the Atomic Safety and Licensing Board, however, stated that, under the administration's budget proposal for fiscal year 2012, the NRC's Licensing Support Network faces a shutdown as of October 1, 2011. The memo went on to say that, when the Licensing Support Network Web site is shut down, the parties' document collections will no longer be electronically accessible by others and suggested alternatives that NRC may consider, which may limit the public's or scientists' access to the document collections.

DOE officials stated that they are also taking steps to maintain several other databases for the use of future scientists, the largest of which is called the Records Information System. These databases generally consist of relevant scientific information related to the storage or disposal of high-

level waste and spent nuclear fuel. According to a DOE contractor responsible for archiving the Records Information System, this database—consisting of 1.8 million electronic documents and 11,000 boxes of hard-copy documents—will be usable and preserved in the same quality as it existed under OCRWM and for 25 years after the termination of the Yucca Mountain program. An official with DOE’s Office of Legacy Management, which assumed responsibility for archiving the data, stated that DOE is on track to complete data preservation efforts by April 2011.

In contrast to the data preservation efforts, efforts to retain Yucca Mountain project staff were minimal. Staff were encouraged to seek other employment and given no incentive to stay with OCRWM to assist with the shutdown. Some DOE and contractor officials told us that retaining key staff during the shutdown process would have been helpful. Nevertheless, the roughly 180 federal staff at OCRWM were all told in March 2010 that their positions would be eliminated by September 30, and they began leaving as soon as they found alternate employment, placing increasing stress on the remaining staff to effectively complete an orderly shutdown. In addition, 60 scientists and engineers who were contractors from Sandia National Laboratories were assigned to other projects. This raised questions among some former site officials we spoke with about whether an orderly shut down had actually been achieved.

DOE also took steps to dispose of large volumes of federal property in office buildings in Las Vegas and in storage containers and warehouses at the Yucca Mountain site. Most of the property in Las Vegas consisted of office furniture and computers, but the property at the Yucca Mountain site varied, including scientific and construction equipment, such as water monitoring equipment and tractors.

DOE Used Expedited Procedures to Dispose of Property, but Its Documentation Was Limited

DOE used expedited property disposition procedures after the shutdown—procedures that officials said were similar to those used to transfer excess property in 2009. The 2009 transfers were necessary, according to DOE officials, because OCRWM’s budget was cut by nearly \$100 million from fiscal year 2008 levels, because OCRWM selected a new management and operating contractor, and because there was a shift in focus from preparing the license application to defending the application and planning for repository design and construction. According to DOE officials, the change in budget and the contractor resulted in a downsizing in the staff in Las Vegas from over 1,000 office suites to about 100 office suites, leaving a large volume of office equipment that had become excess to the program. Upon DOE’s termination of the Yucca Mountain repository

program, the remaining office suites and supporting office and computer equipment were also considered excess by OCRWM.

The General Services Administration (GSA) generally has responsibility for regulating the disposition of federal property.¹⁹ According to GSA regulations, federal agencies must follow a screening process for excess property, unless they declare the property abandoned. In the standard screening processes, agencies first determine if other offices within the agency want the property and, if not, whether other federal agencies would want the property. In either event, the agency can directly transfer the property internally or externally as needed, but it generally should notify GSA of transfers outside the agency. If no other federal agency wants the property, then GSA offers the property for sale first to state and local governments and finally to private citizens through a national sales database. To make the process of property disposition easier, GSA and DOE have developed a simplified Energy Asset Disposal System that is designed to support the screening, reporting, and transferring of property within DOE and subsequently to automatically pass information on unwanted property to GSA for possible transfer to other agencies or for sale.

As an alternative, federal regulations also allow for an agency to declare its excess property abandoned and to dispose of the property on its own. To do so, the agency must first make a determination that the property has no commercial value or that the estimated cost of its continued care and handling would exceed the estimated proceeds from its sale. This regulation is a common-sense rule, according to a GSA official, allowing agencies to dispose of property in cases where it might not make sense to transfer or sell it. In this case, no screening or reporting to GSA is required.

DOE officials stated that, when the agency had such a large reduction in staff between fiscal years 2008 and 2009, agency officials—with advice from DOE's Office of General Counsel—chose the more expeditious route of declaring the excess property to be abandoned. DOE officials explained this was the most efficient pathway because disposing of property quickly would reduce landlord costs by emptying buildings of their equipment, save on utilities and security, and, in some cases, reduce lease costs. In addition, they said they found ready takers for their property within DOE who would be willing to pay the dismantlement, packing, and

¹⁹See 41 C.F.R. pts. 102-36, 102-37.

transportation costs, saving OCRWM money. An internal DOE memo reported in March 2010 that DOE transferred 80 truckloads of office furniture and equipment to DOE's Hanford Site during the previous year, saving the Hanford Site about \$2.1 million.

A GSA official with authority over property management in the West noted that DOE's use of the abandonment regulation was unusual for such a large volume and variety of property. The regulation is usually used when agencies are considering smaller volumes of property for disposal. However, the GSA official stated that the determination of how to apply the regulation is left up to the agency and the fact that DOE found a way to reuse the equipment addressed the overall intent of federal property regulations, as long as DOE did not destroy useful equipment to meet deadlines. According to the abandonment regulation, DOE had to determine that its property had no commercial value or that the cost of its continued care and handling exceeded the estimated proceeds from the sale. DOE documented its decision to abandon the property in an internal memo. DOE's memo stated that storing the furniture and equipment cost about \$680 per day. The memo further stated that, in an OCRWM review of a GSA database, officials found examples of three pallets of miscellaneous computer equipment that were similar to what OCRWM had, but that GSA had not received any offer matching its asking price of \$10. Thus, OCRWM determined that the care, storage, and processing of its property "far surpassed the estimated proceeds from sale." DOE officials stated that their documentation was sufficient for regulatory purposes and added that the time frames for transferring the property would have prohibited additional analysis or documentation. The GSA official said that agencies determine on their own the level of analysis required to declare property abandoned, but that DOE's limited analysis did not seem to address the large volume or variety of property that DOE was transferring.

When DOE decided to shut down the Yucca Mountain repository, it reported in June 2010 that an additional 400 federal and contractor staff would be terminated, again resulting in excess property in the Las Vegas office. DOE used the abandonment regulation again and applied the same example of computer equipment that it used to justify its prior decision. DOE officials explained that a factor in their decision in this case was the closure date of September 30, 2010, which was not flexible and not under the control of OCRWM officials. Several DOE officials told us that they had never seen such a large program with so much pressure to close down so quickly. DOE transferred most of its equipment—about 25 truckloads—to the Hanford Site, as well as to the West Valley site in New York, the National Nuclear Security Administration in Las Vegas, and Sandia

National Laboratories. In addition, DOE donated computer equipment to area schools under the Computers for Learning program.

As of February 2011, DOE officials had transferred very little of the property from the Yucca Mountain site, and it may have lost some of it to break-ins. DOE officials said that, although they had a good inventory of the property they transferred from the office buildings in Las Vegas, they did not have a good inventory of property at Yucca Mountain. DOE kept most of the property at the Yucca Mountain site in locked buildings and storage trailers. After storing this property, DOE officials found the locks broken on at least three occasions. DOE officials said that some property may have been taken, but without an inventory they could not be certain what, if anything, was missing. The Yucca Mountain site is very remote, only accessible by little-known rugged back roads through lands managed by the Bureau of Land Management and the Nevada National Security Site, the latter of which has guarded gates.²⁰ Given the remoteness of the site and the cost of guarding the excess equipment, a DOE official said that DOE did not place guards at the buildings or the storage trailers. OCRWM has passed responsibility for managing this property to DOE's Office of Nuclear Energy, and a DOE official stated that an inventory of the property at the site had been completed by February 2011. A DOE official stated that DOE planned to screen the remaining property at the Yucca Mountain site through the Energy Asset Disposal System. He also noted that, due to the proximity to the former Nevada Test Site, the property will have to be surveyed for radioactivity before it is released.

According to DOE officials, some of the property meeting certain thresholds at the Yucca Mountain site cannot be transferred under the abandonment regulation but, under DOE guidance, must be sold at fair market value and the proceeds returned to the Nuclear Waste Fund.²¹ DOE officials said that they directed the contractor in several transactions to sell excess property at fair market value and to return the proceeds to the Nuclear Waste Fund. The DOE officials provided documentation of one transaction that directed the contractor to sell property and reimburse OCRWM, but DOE was not able to provide us with documentation that showed the sale actually took place or that the fund had been properly reimbursed. DOE officials said that documentation would become

²⁰As of October 1, 2010, responsibility for security of the site has been transferred to the National Nuclear Security Administration.

²¹DOE Accounting Handbook, chapter 19.

available during the contract close-out process. DOE officials further told us that the proceeds from the sales that did take place went back into the Nuclear Waste Fund to support OCRWM's shutdown efforts.

Finally, DOE, under separate statutory authority, transferred about \$400,000 worth of firefighting equipment to Nye County. DOE officials stated that they had originally loaned the equipment to Nye County under a cooperative agreement and that, upon termination of the Yucca Mountain program, the county requested transfer of the equipment. In this case, DOE determined that it was not required to follow GSA's general property disposition provisions or its abandonment regulation. Instead, DOE's Office of General Counsel authorized the transfer of the equipment to Nye County, citing the Atomic Energy Act, which DOE officials said gives them the authority to transfer property in this situation. DOE officials said they made the transfer to assist the county in addressing safety concerns.

DOE Did Not Follow Federal Policy and Guidance for Planning and Assessing Risks of Termination

Federal internal control standards and DOE orders require that DOE sufficiently plan for major activities—including shutdowns—and assess the risks of doing so. According to the *Standards for Internal Control in the Federal Government*, a federal agency should adequately plan to achieve its objectives, such as those in its strategic plans, and identify and analyze the risks it faces.²² Such risk assessments form a basis for determining how risks should be managed. In analyzing such risks, the standards require agency management to consider all significant interactions between the agency and other parties as well as internal factors both agencywide and at the activity level. This would include ensuring an orderly project termination, as well as considering the possible impacts of a ruling by the NRC commissioners or the federal courts that could require that the Yucca Mountain license application review process be resumed. Furthermore, DOE's own orders direct officials to adequately plan projects to maintain effective and efficient use of federal resources and to ensure it has adequate resources to implement its projects, whether the project is new construction or the termination of

²²GAO, *Standards for Internal Control in the Federal Government*, [GAO/AIMD-00-21.3.1](#) (Washington, D.C.: November 1999).

an existing program.²³ Under these orders, DOE must also assess the risks associated with its efforts.

In implementing its ambitious shutdown schedule, however, DOE did not complete formal approved plans to guide its shutdown activities or assess risks. Although DOE had drafted a shutdown plan by February 2010, DOE officials told us that it was never approved. DOE thus had no formal implementation goals or milestones to guide progress, which our past work has shown to be a key practice in implementing organizational transformations.²⁴ The department's Inspector General also expressed concern about the lack of such a plan, given the scope and complexity of the shutdown and the possible effects on areas, such as the preservation of intellectual, scientific, and technological information and the disposition of property. In written comments to the Inspector General, DOE responded that it had developed groups organized around functional areas identified in its draft shutdown plan. The Inspector General noted that DOE's efforts, while significant, were still no substitute for having a shutdown plan. According to DOE General Counsel and former OCRWM leadership, the September 30 deadline did not allow time for formal planning, although officials stated that they believed that the necessary planning did occur. For example, at least weekly meetings were held with key staff to discuss the shutdown, identify and address any problems, and keep progress on track. DOE officials stated that they believe that, despite the lack of formal approved plans, the shutdown was orderly and they accomplished what they set out to do.

However, some DOE and contractor officials stated that more time to plan for the shutdown would have been helpful, but the administration's budget proposal only funded the shutdown effort through the end of fiscal year 2010. Former OCRWM officials said that they did the best they could to meet the shutdown target, but as they were carrying out the shutdown, there were concerns that the schedule was too short. DOE's primary contractor at Yucca Mountain also expressed concern. The contractor noted in a June 2010 letter that contracts of this scale generally take 2 years or more to close out. The contractor agreed in June to meet DOE's September 30 date—less than 4 months away—by adopting “creative and

²³For example, see DOE Order 413.1B, Internal Control Program and DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets.

²⁴GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, [GAO-03-669](#) (Washington, D.C.: July 2, 2003).

unusual approaches,” such as the transfer of residual work to other parties and saving interim technical work products as-is with no additional effort to document objectives, plans, status, or path forward.

Risk assessment, a key part of planning, was also not formally carried out. Specifically, risk assessment requires identifying and analyzing relevant risks associated with achieving objectives and forming a basis for determining how risks should be managed. DOE officials told us, however, that the September 30 shutdown date did not provide sufficient time for both a formal risk assessment and the actual shutdown tasks. Officials added that although they did not complete a formal risk assessment, they did consider the possible risks of shutting down the program as they were carrying out the work, including the risk to DOE’s ability to resume the licensing review process, if necessary. As an example, officials noted that DOE did not cancel its management and operating contract, in part so that it would be easier to resume licensing activities if it were required to do so, according to testimony by the former Acting Principal Deputy Director of OCRWM. Similarly, DOE helped federal employees at OCRWM to remain at DOE, in part to facilitate efforts to reconstitute the Yucca Mountain work force, should the need arise, according to the testimony.²⁵ Although DOE General Counsel and other officials said they considered planning and risk issues as the program was being dismantled, they also told us they would not prepare any formal plans or risk assessments unless DOE was ordered to resume licensing activities and they were required to do so.

Loss of Staff Expertise Could Slow Progress If License Review Is Resumed

The loss of staff with experience at Yucca Mountain could hinder the license review if the process is resumed because DOE plays an important role in defending the license application. DOE has taken extensive efforts to preserve data from the Yucca Mountain project. However, experienced and trained staff are also necessary if DOE is to successfully carry out this role. Specifically, DOE would need to:

- Provide technical, scientific, and legal support for court challenges.

²⁵This testimony was given in a deposition from DOE’s Acting Principal Deputy Director of OCRWM filed with DOE’s response to a motion filed in federal court by the state of Washington seeking a preliminary injunction to prevent DOE from taking any further actions to terminate or dismantle the Yucca Mountain program.

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- Maintain and update the license application and supporting documents as issues resulting from about 300 contentions—legal challenges to the license application—were resolved and NRC information requests were responded to.
 - Prepare DOE witnesses and testimony for hearings.

Before their positions were eliminated in 2010, about 180 federal staff at OCRWM and an additional 60 scientists and engineers who were contractors from Sandia National Laboratories were on staff, in part to defend the license application. A DOE official stated that, although the licensing process could be carried out with fewer staff, it would nevertheless require 25 to 30 highly trained scientists and a larger number of support personnel.

Reconstituting this expertise and teamwork could be difficult should the licensing process be resumed. According to DOE and Sandia National Laboratories officials, it took DOE years to recruit and train the proper mix of scientists and engineers—from diverse disciplines such as hydrology, geology, and mathematics—to work on the license application. The officials stated that a difficult but important part of this effort was turning a group of independent researchers into a team that could work together under a nuclear safety and regulatory framework. One result of their work was the development of models that simulated Yucca Mountain's safety performance, a key element of the license application. According to DOE and NRC officials, the team of scientists that developed the models would have been the most qualified to explain and defend these models during the hearings of NRC's Atomic Safety and Licensing Board. These officials expressed doubt that many of these specialists would return to work on Yucca Mountain if the license review were resumed because most have moved on to new projects and assignments, many in other parts of the country. Some stakeholders we spoke with, including former OCRWM employees, said some of the former staff would likely not return to a program they felt that the administration did not support. According to DOE officials, about 25 percent of former OCRWM employees are no longer with DOE. Nonetheless, DOE General Counsel officials stated that it would be possible, if the staff were still working at DOE, to encourage or require them to work on the Yucca Mountain repository program should it be resumed. The officials stated that they believed that a team could be reassembled, but that it might take many months to do so and it might not have some of the staff who performed the original work.

Other officials with whom we spoke expressed concerns about DOE's ability to reassemble its team. A former Acting OCRWM director stated—in an April 2010 declaration filed in federal court²⁶—that he had years of experience on the Yucca Mountain program and overseeing the creation of teams and, based on his experience, “it will take well more than 2 years to put a team back together, and even then it may not be successful.” In addition, an official at Sandia National Laboratories with management responsibilities over the Yucca Mountain program stated that, if DOE were to resume licensing activities, it would be helpful to reconstitute staff with original experience in the technical aspects of the license application, but that the more time that passes, the harder it would be to do so. He noted that it would be possible to find replacements, but that training them to become proficient may take time, and the quality of the license defense could be jeopardized.

DOE officials said they took some measures to mitigate the risk of losing technical expertise for the license application review process. For example, although OCRWM managers did not track staff, they said that DOE's Office of Human Capital did have access to the locations of the former OCRWM staff that still work for DOE. OCRWM officials stated they had no access to information on location and availability of former laboratory or contractor staff, but that they felt the laboratories or the contractor could provide that information, if needed. Also, in May 2010, OCRWM asked its prime contractor for a plan to shut down Yucca Mountain. OCRWM initially gave the contractor 6 days to produce a plan but granted the contractor's request for an extension to 14 days. The contractor produced a \$2.8 million proposal to prepare, among other things, a plan for “knowledge retention packages” that included an effort to mitigate the threat of the irrecoverable loss of expert knowledge as staff members depart the Yucca Mountain repository program. The contractor said these packages would give DOE the ability to more easily resume the license application review proceedings, if required. According to the contractor, these packages would have included a strategy for addressing contentions and preparation for officials who might serve as witnesses during hearings. The proposal stated that the aim was to capture the knowledge of current witnesses in a manner that would be readily available and understandable should the proceeding be restarted with a

²⁶This declaration was filed on April 2, 2010, as part of a federal lawsuit brought by Robert L. Ferguson, Gary Petersen, and William Lampson asking the federal court to review the final determination of the President and the Secretary of Energy to terminate Yucca Mountain.

different individual as the witness. In a written response to this proposal, however, DOE stated that the knowledge retention packages were “both costly and unnecessary.” DOE officials further stated that this proposal extended beyond the September 30, 2010, closure date and would require a large expenditure of government funds that DOE managers found wasteful, such as videotaping scientists. As a result, the knowledge retention packages were not approved by DOE and were not prepared by the contractor.

In addition to DOE, NRC has also taken some actions that could also hinder the resumption of the license review process for Yucca Mountain. NRC effectively suspended the technical review of the license application on October 4, 2010, after Congress, on September 30, 2010, passed a continuing resolution that continued fiscal year 2010 funding levels for fiscal year 2011 appropriations from October 1 through December 3, 2010. NRC then issued guidance that it would apply fiscal year 2010 funding levels for all programs except the Yucca Mountain license review process. For that program, NRC announced it would fund at the President’s fiscal year 2011 budget proposal, which included a close-out of the license review activities at the end of the fiscal year. Although no NRC staff have been eliminated, an NRC official said that they are being reassigned to other programs. The NRC staff had originally planned to issue a key safety evaluation report in November 2010 as part of NRC’s technical review, but NRC announced it no longer plans to issue that report. Also, even though the Atomic Safety and Licensing Board announced plans to continue with the licensing proceeding in consideration of challenges to the license application in late 2010, pursuant to the October 4, 2010, budget guidance the board is now closing out its activities. According to NRC’s Chief Financial Officer, both the NRC staff and the Atomic Safety and Licensing Board are to submit plans to the NRC commissioners for an orderly shutdown of activities in 2011. The NRC Inspector General is investigating whether NRC had the authority to adopt the fiscal year 2011 budget proposal. In a separate action, the parties that are currently suing DOE and NRC asked the court to lift its stay and expedite proceedings, in part, because of NRC’s actions. In response, the United States Court of Appeals for the District of Columbia Circuit announced that oral arguments would be held on March 22, 2011.

Termination of the Repository Program Could Provide Some Benefits, but Adverse Impacts Are Likely

Terminating the Yucca Mountain repository program could bring benefits, primarily the opportunity for DOE to seek new approaches to nuclear waste management that could be more widely accepted by the public, particularly since Yucca Mountain had little support from the state of Nevada. However, termination would also restart the costly and time-consuming process of finding a permanent disposal repository or some other solution for spent nuclear fuel and could take decades and billions of additional dollars. Furthermore, termination would likely prolong the need for interim storage of spent nuclear fuel at reactor sites, which would have financial and other impacts.

Termination Would Provide a Key Benefit

A key benefit of terminating the Yucca Mountain repository program, cited by the Secretary when explaining the termination decision, is the opportunity to seek other approaches that might achieve broader acceptance than Yucca Mountain. The proposal to build a permanent repository at Yucca Mountain has faced significant opposition from some politicians and members of the public, particularly in Nevada. Past proposals for repositories at other sites, such as the Hanford Site, faced similar opposition. If a more widely accepted alternative is identified, it carries the potential for avoiding costly delays experienced by the Yucca Mountain repository program. However, there is no guarantee that a more acceptable alternative will be identified. The Secretary stated that advances in technology have provided the nation with time to develop an alternative approach to permanent disposal that might be more widely accepted. DOE, in a statement to the Atomic Safety and Licensing Board, stated that recent advances in methods for storing spent nuclear fuel in dry casks, rather than pools of water, will allow the spent fuel to be stored on site for a much longer period of time—perhaps as long as 300 years. During this time, scientists could research and develop other alternatives for a permanent solution. Furthermore, DOE stated that reprocessing of spent nuclear fuel has the potential to reduce the amount of nuclear waste and improve waste forms for disposal, although DOE noted that the technology is still in its early stages. DOE has not yet identified other alternatives and has tasked the Blue Ribbon Commission with doing so.

The full significance of this benefit is not yet clear because there is not yet an effective, affordable alternative to a permanent geologic repository. Although alternatives for managing spent nuclear fuel might be identified in the future, the National Research Council of the National Academies

reported that, for the foreseeable future, the only alternatives capable of ensuring the safety and security of spent nuclear fuel are continued storage and geologic disposal.²⁷ For example, alternatives—such as disposal in narrow shafts bored deep into the ground—could be feasible but face cost or technical constraints. We reached the same conclusion in our November 2009 report, for which we consulted 147 national experts about alternatives to the Yucca Mountain repository.²⁸ Technologies to reduce the radioactivity or volume of spent nuclear fuel, such as reprocessing or the use of advanced reactors, still face technical and economic challenges and do not eliminate the need for a permanent disposal alternative.²⁹ In addition, the Chief Executive Officer of the Nuclear Energy Institute told the Blue Ribbon Commission that, even with reprocessing, the nation will still need a geologic disposal facility.³⁰

Termination Would Restart a Costly, Time-Consuming Process

The termination of Yucca Mountain essentially restarts a time-consuming and costly process. In the case of Yucca Mountain, this process has already cost nearly \$15 billion through 2009 and, if work on Yucca Mountain had continued, it could have cost an additional \$41 billion to \$67 billion more to complete, as we reported in 2009.³¹ DOE officials told us that many factors, including some outside DOE's control, could have affected when the Yucca Mountain repository would have opened, or whether it would have opened at all. If work on licensing and constructing Yucca Mountain had continued, DOE would have had to obtain NRC license approval, certain crucial permits from the state of Nevada, funding from Congress, and other key congressional actions, such as permanently

²⁷National Research Council of the National Academies, *Disposition of High-Level Waste and Spent Nuclear Fuel: The Continuing Societal and Technical Challenges* (Washington, D.C.: 2001).

²⁸GAO, *Nuclear Waste Management: Key Attributes, Challenges, and Costs for the Yucca Mountain Repository and Two Potential Alternatives*, [GAO-10-48](#) (Washington, D.C.: Nov. 4, 2009).

²⁹We previously reported that construction of a reprocessing plant could cost as much as \$44 billion. The Congressional Budget Office estimated that annual costs for operating a reprocessing facility could cost between \$2 billion and \$4 billion. See [GAO-10-48](#).

³⁰Statement of Marvin Fertel, Chief Executive Officer of the Nuclear Energy Institute, before the Blue Ribbon Commission on May 25, 2010. Note also that the Nuclear Energy Institute favors consolidated storage of spent nuclear fuel, rather than leaving it on site. See http://brc.gov/may2010_meeting.html.

³¹[GAO-10-48](#). Amounts are in 2009 present value.

withdrawing public land for the repository. Despite these challenges, DOE's 2008 estimate for opening the Yucca Mountain repository—before DOE took steps to terminate it—was 2020. While we recognize this 2020 date was not certain, we know of no better assumption to meaningfully assess the impact of a termination of the Yucca Mountain repository program. In written comments to us, DOE officials stated it is speculation to say a new strategy will take longer to implement than continuing with the Yucca Mountain program because there was no guarantee of when, if ever, the many significant steps for opening the Yucca Mountain repository would have been completed. Since the comment provides only a hypothetical bounding possibility—the Yucca Mountain repository might have never opened, even without DOE's current steps to terminate it—rather than a new estimate for when the repository might have opened, we note the DOE officials' position but, with the exception of noting prior work, we do not analyze it further.

DOE officials told us that it is conceivable that an alternative to Yucca Mountain could be developed and implemented before Yucca Mountain might ever have opened, such as opening a centralized interim storage facility. Although DOE suggested that the Blue Ribbon Commission may come up with alternatives that could be implemented sooner than Yucca Mountain might have opened—particularly if the alternative has more public acceptance and avoids costly delays due to local opposition—we reported in 2009 that there were no other permanent alternatives to the Yucca Mountain repository that could be implemented sooner than the 2020 projected date of opening Yucca Mountain. Although any permanent disposal alternatives would come with uncertainties as to their cost and schedule—as well as to their public acceptance—it is likely to take decades to develop. We reported in 2009 that, according to a manager of an industry effort to establish a centralized interim storage facility, even a federal centralized interim storage facility is likely to take 17 to 33 years to plan and implement.³² An interim storage facility would include, among other things, siting, licensing, and constructing the facility and accompanying transportation infrastructure, as well as coordinating

³²GAO-10-48. Dozens of experts reviewed our assumption for centralized interim storage, which we assumed would take 19 years to begin operations. The experts did not recommend changing that assumption. Some of the experts represented DOE, NRC, the National Academy of Sciences, the Nuclear Waste Technical Review Board, the Massachusetts Institute of Technology, the Nuclear Energy Institute, the National Association of Nuclear Regulatory Utility Commissioners, the National Council of State Legislators, and the State of Nevada Agency for Nuclear Projects, and a variety of other academic, industry, and independent groups.

transportation routes with states. If such a facility were initiated in 2011, this makes the most likely initial opening date somewhere from 2029 to 2045.³³ It is possible that industry might develop and implement its own interim storage facilities sooner, but, as we reported in 2009, an interim storage facility is not a permanent alternative to a repository.

Nevertheless, by terminating work on Yucca Mountain, DOE likely would have to restart the process for any alternative repository site, since every site is unique, according to NRC officials. Some of the officials we spoke with estimated that the termination of Yucca Mountain could set back the opening of a new geologic repository by at least 20 years and cost billions of dollars. Some stakeholders referred to the termination as “kicking the can down the road.” Moreover, several DOE and NRC officials and industry representatives stated that ending the license review process before allowing NRC to review the merits of the application was a loss of potentially valuable information, particularly NRC’s assessment regarding acceptability of the license application.

As a result of the termination of the Yucca Mountain repository program, DOE may also need to seek additional funding for an alternative repository. About 60 percent of the cost of developing a repository has thus far been paid for by the nuclear waste fund, but utilities only pay into the fund for as long as their reactors are operating. Most of the reactors in this country are working to obtain a license extension or have already obtained one for an additional 20 years of operation, and it is not clear how much longer reactor operators will be paying into the nuclear waste fund. As reactors retire, they will need to be replaced by new reactors paying into the fund, or, according to DOE officials, the fund will be drawn down faster than it can be replenished. According to DOE officials, the nuclear waste fund was designed to build a large surplus that could be relied upon for when the very high construction costs exceed annual contributions; then, the generally high, but decades-long costs for operations, during which the nuclear waste fund is likely to be drawn down. For example, our analysis of DOE’s cost projections for Yucca Mountain shows that construction of a repository would have averaged over \$1.7 billion annually, but with some years exceeding \$2 billion. Although the costs of siting, licensing, constructing, and operating an alternate repository site are uncertain, or even if a repository will be the path followed by DOE in the near future, DOE has already spent about \$9

³³DOE generally agreed with our findings in this report.

billion from the nuclear waste fund. If DOE were to pursue an alternate repository—assuming an alternate repository would have costs similar to the Yucca Mountain repository—it is not certain that the fund will have built up a sufficient surplus to site, license, construct, and operate it. DOE makes an annual assessment of the adequacy of the nuclear waste fund to ensure that full costs of a disposal program will be fully recovered. In November 2010, the Secretary determined that the fund was adequate, even though an attachment stated that DOE had no alternative to the Yucca Mountain repository, and that the Yucca Mountain repository provided the closest “proxy”—in terms of cost—to an alternative. If the nuclear waste fund does not have a sufficient surplus for an alternate repository, additional funding would have to be found. One option, according to DOE officials, is for the Secretary to propose an adjustment of the fee in accordance with the NWPA, but they said the agency must do so while nuclear reactors are still operating. Moreover, since the taxpayers have paid a proportion of the costs to establish a repository for DOE-managed high-level waste and spent nuclear fuel, the taxpayers may also end up paying more for an alternate repository. In addition, the proposed termination has prompted calls from industry for DOE to suspend collection of payments into the Nuclear Waste Fund. Industry has argued that their customers should not pay for a repository effort that has been shut down, with no work being done on an alternative. Suspending payments into the Nuclear Waste Fund could reduce the funds set aside for a repository.

Termination Would Prolong On-site Storage and Increase Costs

The proposed termination of Yucca Mountain, which had been planned to be opened in 2020, will likely prolong storage at reactor sites, which would increase on-site storage costs. Because of delays in opening the Yucca Mountain repository, on-site storage at commercial nuclear facilities has been the *de facto* near-term strategy for managing spent nuclear fuel. Most spent nuclear fuel is stored at reactor sites, immersed in pools of water designed to cool it and isolate it from the environment. With the extension of on-site storage because of the delays in opening Yucca Mountain, some reactors are running out of space in their pools and have turned to dry-cask storage systems. In 2009, we reported that such systems for reactor operators cost from about \$30 million to \$60 million per reactor, with costs increasing as more spent nuclear fuel is added to dry storage.³⁴ We

³⁴[GAO-10-48](#).

also reported that the spent nuclear fuel would likely have to be repackaged about every 100 years, although experts said this is uncertain and research is under way to better understand the longevity of dry-cask systems. This repackaging could add from about \$180 million to nearly \$500 million, assuming initial repackaging operations, with costs dependent on the number of casks to be repackaged and whether a site has a transfer facility, such as a storage pool.

Prolonging on-site storage would add to the taxpayer burden by increasing the substantial liabilities that DOE has already incurred due to on-site storage at commercial nuclear reactors. Were DOE to open Yucca Mountain in 2020, as it had planned, and begun taking custody of spent nuclear fuel, it would still have taken decades to take custody of the entire inventory of spent nuclear fuel. Assuming a 2020 opening of Yucca Mountain, DOE estimated that the total taxpayer liabilities for the backlog as of 2020 would be about \$15.4 billion and would increase by \$500 million for each year of delay thereafter.³⁵ It is important to recognize that these liabilities are outside of the nearly \$15 billion already spent on developing a repository and the estimated \$41 to \$67 billion still to be spent if the Yucca Mountain repository were to be constructed and become operational, most of the cost of which is borne by the Nuclear Waste Fund. Instead, these liabilities are borne by taxpayers because of the government's failure to meet its commitment to take custody of the waste has resulted in lawsuits brought by industry.³⁶ Furthermore, not all of the lawsuits have been resolved and industry has claimed that the lawsuits still pending could result in liabilities of at least \$50 billion. Some former DOE officials and industry and community representatives stated that the termination of the Yucca Mountain program could result in an additional delay in the opening of a repository by at least 20 years, which would lead to additional DOE liabilities in the billions of dollars. Until a final disposition pathway is determined, there will continue to be uncertainties regarding the federal government's total liabilities.

³⁵These amounts do not include \$956 million already paid by taxpayers through the Department of Treasury's judgment fund. These amounts are in constant fiscal year 2010 dollars.

³⁶In addition, the Department of Justice has already incurred costs of over \$168 million through fiscal year 2010 to defend DOE in litigation. With ongoing litigation, these costs will continue. There are no estimates of the future liability of these costs.

At decommissioned reactor sites, prolonged on-site storage could further increase costs or limit opportunities for industry and local communities, according to industry and community representatives.³⁷ As long as the spent nuclear fuel remains, the sites would not be available for other purposes, and the former operators may have to stay in business for the sole purpose of monitoring, storing, and providing costly security for the fuel. Local communities could lose the potential use of the site for alternative purposes, potentially impacting economic growth and tax revenue. For example, according to an industry representative, a local government in Illinois would like to encourage development of property fronting Lake Michigan near a shutdown nuclear reactor planned for decommissioning. A local government official stated in an interview with the media, however, that it may be difficult to develop and sell the property because prospective buyers may feel uneasy about living next to a site storing spent nuclear fuel. Similarly, a local government official from Minnesota expressed concern about having to provide security and emergency response for the Prairie Island reactor site and its spent nuclear fuel because tax revenues from the facility will decrease substantially after it is decommissioned. However, these issues may not affect all reactor sites. For example, officials in Oregon told us they did not feel dry-cask storage at Trojan, a decommissioned reactor, adversely affected economic growth or tax revenue. This site is about 42 miles north of Portland, Oregon, and is not in a major metropolitan area.

Prolonging on-site storage could also increase opposition to expansion of the nuclear industry, according to state and industry officials. Without progress on a centralized storage facility or repository, some experts have stated that some state and local opposition to reactor storage site recertification will likely increase and so will challenges to nuclear power companies' applications for reactor license extensions and for new reactor licenses.³⁸ For example, Minnesota officials noted that negative public reaction to a proposal to increase dry-cask storage at a nuclear plant led the state legislature to impose a moratorium on new nuclear plants. At least 12 other states have similar prohibitions on new construction, 9 of

³⁷Decommissioning is the safe removal of a facility from service and the reduction of residual radioactivity to a level that permits release of the property and termination of the license. In the case of decommissioned nuclear power plants, the spent nuclear fuel may remain on site, so that the NRC would continue to license the site as an independent spent fuel storage installation.

³⁸[GAO-10-48](#).

which can be lifted when a means of disposing of spent nuclear fuel can be demonstrated. Representatives from some tribal and environmental organizations said they were concerned with the long-term on-site storage of spent nuclear fuel. They said nuclear plants should take additional measures to ensure the safety and security of dry-cask storage sites, and they have raised these concerns in objecting to the relicensing of commercial reactors in Minnesota and New Jersey. For instance, tribal officials from the Prairie Island Indian Community in Minnesota told us they opposed relicensing the Prairie Island Nuclear Generating Plant because of environmental and safety concerns they have about living just 600 hundred yards from spent nuclear fuel.

Termination Could Further Damage DOE's Credibility

A final impact of terminating Yucca Mountain is that communities may be even less willing to host spent nuclear fuel repositories or other storage sites in the future due to further erosion of DOE's credibility. Credibility has long been a problem for DOE. For instance, in 1984, a DOE expert panel found that DOE's credibility was already low in the early 1980s because of its past "ill-handled" repository siting experiences in Kansas, Michigan, and New Mexico. According to the panel's report, DOE's credibility was further strained at that time during initial site selection efforts because its site selection guidelines were criticized as being "superficial and vague." DOE continued to face credibility issues over the next 2 decades because of delays in the Yucca Mountain project. Several stakeholders—including former DOE officials and officials from state government, and representatives from industry and community groups—said that DOE's decision to terminate the Yucca Mountain repository program has further damaged DOE's credibility.

Past Experience May Yield Potential Lessons for Future Nuclear Waste Management Efforts

Our review of reports and interviews with DOE and NRC officials and representatives of various national associations, local and state governments, and community organizations suggest two broad lessons for future repository efforts or other nuclear waste management efforts. First, overcoming social and political opposition is crucial, and transparency, economic incentives, and education are important tools in doing so. Second, in developing a waste management alternative, it is important to have consistent policy, funding, and leadership, since any such effort will take decades.

Transparency, Incentives, and Education Are Important in Overcoming Opposition

Reports spanning several decades cite societal and political opposition as key obstacles to siting and building a permanent repository. In 1982, the Office of Technology Assessment, an office of Congress from 1972 to 1995 that provided congressional members and committees with analysis of scientific and technical issues, reported that after 3 decades of study, there are “no insurmountable technical obstacles” and that the “greatest single obstacle” to building a repository is an erosion of public confidence in the federal government.³⁹ The National Research Council of the National Academies reiterated this conclusion in a 2001 report, stating that the most significant challenge to siting and putting into service a repository is societal.⁴⁰ This lesson has also been borne out by previous U.S. attempts to build repositories. At Yucca Mountain, lack of public support in Nevada was a key reason DOE decided to terminate the effort, according to DOE. In contrast, local community support was a key element in the success of the Waste Isolation Pilot Plant (WIPP) repository in New Mexico. WIPP is currently the world’s only operating permanent geologic repository for nuclear waste, although it only accepts defense-related transuranic waste and, according to a New Mexico state official, did not win support from the state to accept high-level waste.

No nation has built a permanent repository for spent nuclear fuel or high-level radioactive waste. Therefore, as industry and community representatives pointed out, there is no model or set of lessons that will guarantee success in this complex, decades-long endeavor. Various reports and stakeholders noted that transparency, incentives, and education were important features that could improve the likelihood of success. However, some social and political opposition may be extremely difficult to overcome, regardless of any of these features. For example, in 1992, DOE sought to develop a temporary spent nuclear fuel storage facility in Wyoming, but the Wyoming governor stopped that effort. In a letter to the county seeking to host the facility, the governor wrote that, despite the assurances of federal officials, even those with personal integrity and sincerity, he could not be sure that the federal government’s attitudes or policies would remain the same over the next 50 years. He wrote that, once the federal government gains a foothold to a nuclear

³⁹Office of Technology Assessment, *Managing Commercial High-level Waste* (Washington, D.C.: 1982).

⁴⁰National Research Council of the National Academies, *Disposition of High-Level Waste and Spent Nuclear Fuel: The Continuing Societal and Technical Challenges* (Washington, D.C.: 2001).

program in the state, the state may be powerless to have any further say in the program.

Transparency and Cooperation

Several reports, DOE and state government officials, and industry and community representatives noted that transparency in dealing with local and state governments and affected parties may help overcome local and state opposition to a repository. Transparency demonstrates a willingness to address concerns openly and fosters the dialogue necessary to resolve differences and enhance cooperation, according to reports and interviews. DOE and state and local government officials said that transparency was an important factor in the successful opening of WIPP. For example, DOE evaluated key technical issues in the design of WIPP in part by using panels of independent experts, whose internal discussions and results were open to the public. Furthermore, according to a DOE report, stakeholders and the public were invited to actively participate in many WIPP technical meetings, and the public was allowed access to technical documents on characterizing the WIPP site. A report by scientists and managers at Sandia National Laboratories found that these efforts built confidence in the acceptability and integrity of the science program and built public trust.

Conversely, state government officials told us that, if local communities or states feel that the federal government is not willing to address their concerns in a transparent way, they will be less inclined to work cooperatively with the federal government. For example, during the 1960s, the Atomic Energy Commission attempted to develop a high-level waste repository in a salt formation near Lyons, Kansas. Critics charged that the commission was not transparent in its efforts, instead rushing to its decision and refusing to address the concerns of local and state officials. The commission abandoned its plans for the Lyons site in 1972, after opposition intensified and additional technical questions arose, such as whether it was possible to plug exploratory gas and oil shafts at the site. Similarly, according to a former DOE official and state and local government officials, DOE lacked transparency in developing its plans for the Yucca Mountain repository. For example, during studies of the mountain over the past 20 years, DOE found that water moved through the area faster than previously realized. As DOE site characterization and design activities continued, DOE's engineering designs changed, such as improved alloys for waste canisters to delay corrosion and titanium-based drip shields to keep the canisters dry. According to a former DOE official and representatives from state and local governments and a community group, DOE did not consult with the local or state governments or other affected parties in developing these new solutions; it also did not establish

independent scientific panels or any form of state oversight that might have given affected parties more confidence in the solutions. DOE included these technologies in its license application, but they have now become the focal point of several of the challenges raised in the licensing proceeding.

Another way to gain support is to promote state involvement in key decisions and oversight, according to a state government official and DOE contractors. This is important because, although many communities might be found willing to host a repository, most states would not be willing to do so because of broader constituencies and issues related to federal-state relations. For example, despite the growing willingness of the community of Carlsbad and of communities along the transportation routes to host the repository, the state of New Mexico continued to oppose WIPP, as did many activist groups. The project might have ended due to state opposition, but DOE conceded some of its authority to the state, agreeing to fund the Environmental Evaluation Group in 1978, a technical oversight group made up of independent technical experts and funded through a DOE contract. The state did not consider this enough to address its key concerns, however. Specifically, the state was concerned that DOE had already made a decision to site a repository in New Mexico before technical assessments had been completed and that the state had no enforceable legal mechanism for asserting its rights. As a result, the state sued DOE and, in exchange for the state's dropping the lawsuit, DOE made further concessions when DOE and the state signed the Consultation and Cooperation Agreement in 1981, giving the state greater input and oversight on WIPP. The agreement, according to a state government official, set the stage for both sides to work cooperatively together to resolve future differences. Without these concessions and agreements, WIPP might have been further delayed in opening or might never have opened at all, according to a WIPP project leader for the state of New Mexico. In contrast, although the NWPA established an independent oversight group and DOE held public meetings, DOE and the state of Nevada never established an agreement similar to the Consultation and Cooperation Agreement DOE signed with New Mexico, which would have given Nevada an oversight role over the Yucca Mountain repository.⁴¹

⁴¹The NWPA created the Nuclear Waste Technical Review Board, an independent federal agency to provide scientific and technical oversight for Yucca Mountain. The board's mission and reports can be found at <http://www.nwtrb.gov/>.

Long-term Incentives

Many stakeholders we talked to, including officials from DOE and state government, a former DOE official, and representatives from community groups, said substantial, long-term investments in the host community and state can help win support. Long-term investments keep key parties committed to a repository effort after it has begun, which is important in an effort that will take several decades. Several of the stakeholders said that significant investments in infrastructure or local economic development are preferable to cash payments, which can end at any time. State government and DOE officials said that the benefits package for Yucca Mountain in the NWPA—including \$20 million per year in cash after receipt of the first spent fuel until closure of the facility—was not enough to be considered an incentive for Nevada, particularly since Nevada was expected to make a concession for other states without any commensurate contribution from those states. Although Nevada currently purchases electricity from utilities that generate electricity from nuclear power, this may not have been the case when Yucca Mountain was first selected. In the case of WIPP, a New Mexico state official stated that one agreement DOE negotiated with New Mexico guaranteed funding for highway improvements along WIPP’s transportation routes for 15 years, totaling \$300 million. In addition to a benefits package, comments reflecting views from DOE, local government, and the National Academy of Sciences, suggested that the federal government should consider penalties designed to discourage local and state governments from taking advantage of benefits without upholding long-term commitments. According to reports, many other countries are also offering benefits for communities willing to host a geologic repository. The amount and type of benefit varies. For example, Sweden provided a cash payment of \$60 million to the community selected to host a repository in that country. Although France is still in the planning stages for its repository, it is planning long-term economic development for the host community.

Education

Some stakeholders told us that education may be needed to overcome misperceptions about nuclear waste and its storage to gain public acceptance. Members of community and academic groups, including the National Academy of Sciences, told us that some members of the public incorrectly equate spent nuclear fuel with nuclear weapons. They associate spent fuel with images of mushroom clouds from the detonation of a nuclear warhead, when in fact spent nuclear fuel cannot explode. Education has proved useful. For example, DOE’s contractor at WIPP involved local communities situated along the transportation routes throughout the state, providing education and training programs and equipment related to the safe transportation of radioactive waste. These efforts resulted in increased acceptance of the project, according to local

government officials and community representatives. Other countries are also pursuing education. For example, Canada's initial efforts at developing a geologic repository were tabled due to a lack of public support, and the country's newly created Nuclear Waste Management Organization has made education one of several key issues related to long-term management of spent nuclear fuel. This is a key effort to gain public acceptance for its new repository project, according to a report recently issued by the organization.

Consistent Policy, Funding, and Leadership Are Important in Any Waste Management Effort

Based on reports and interviews with DOE and NRC officials, representatives of various national associations and community organizations, and local and state government officials, we identified a second broad lesson—emphasizing consistent policy, funding, and leadership—that may help address societal and public opposition to a repository or other waste management alternative over the decades it will take to complete the effort.

Consistent Policies

Our previous reports about programs at DOE and other agencies have highlighted the importance for policies to be credible and consistent to be effectively implemented.⁴² Several stakeholders we interviewed and the reports we reviewed reaffirmed this.

According to reports and interviews, the nation's nuclear waste management policies over the past several decades have not been consistent, which has contributed to public opposition. In particular, an independent report issued in 1984 on alternative methods for financing and managing the nuclear waste program stated that there was a serious and inherent lack of stability and continuity in the nation's nuclear waste management program that adversely impacted DOE's credibility.⁴³ More recently, stakeholders we spoke with from states, industry, and community

⁴²See, for example, GAO, *Department of Energy: Actions Needed to Develop High-Quality Cost Estimates for Construction and Environmental Cleanup Projects*, [GAO-10-199](#) (Washington, D.C.: Jan. 14, 2010); and *Environmental Health: High-level Strategy and Leadership Needed to Continue Progress toward Protecting Children from Environmental Threats*, [GAO-10-205](#) (Washington, D.C.: Jan. 28, 2010).

⁴³Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities, *Managing Nuclear Waste – A Better Idea* (Washington, D.C.: 1984). This report was authorized by the Secretary of Energy in 1983 in response to Sec. 303 of the NWPA, which required the Secretary of Energy to study alternative approaches to managing the construction and operation of all civilian nuclear waste management facilities.

groups pointed out changes in nuclear waste management policy that they considered inconsistent. For example, some stakeholders said that the NWPA originally contemplated several sites in the West and several in the East to be evaluated for a potential nuclear waste repository, with the final result being one repository in the West and one in the East. However, a 1987 amendment to the NWPA eliminated this approach and directed DOE to focus its site characterization efforts only on Yucca Mountain.

In addition, federal agencies have at times been inconsistent in their policies on safety standards for a repository, considered one of the more critical issues for public acceptance. For example, the federal government did not have post-closure safety standards in place for either WIPP or Yucca Mountain when it began work assessing the likely performance of each repository's design, making it difficult for the federal government to determine how well the repository needs to perform to protect public health or what reliance to place on natural or engineered systems. Although work began at WIPP in 1974, the Environmental Protection Agency (EPA) was not given authority to issue safety standards for offsite releases from radioactive material in repositories until NWPA, in 1983. EPA issued generic safety standards in 1985 and standards specific to WIPP in 1996. EPA did not issue safety standards specific to Yucca Mountain until 2001, even though DOE had begun to focus its work there in 1987. EPA's standards directed that the repository's safety must be demonstrated over a 10,000-year period. However, after several groups filed suit, alleging that certain standards were not sufficient, EPA revised some standards in 2008 to use a 1-million-year period during which safety must be demonstrated. A former DOE official and a community group representative said the initial lack of standards galvanized opposition in both New Mexico and Nevada, and the 1-million-year standard, which many stakeholders we interviewed, including scientists, described as an unreasonably long time period for accurate projections, brought the credibility of Yucca Mountain standards into question.

For example, some reports we reviewed and stakeholders we interviewed from state and community groups, stated that to achieve consistency, a nuclear waste management program should be insulated from the political influences and changes in policy that have plagued the process for decades. They stated that policies are inherently likely to change over the time it will take to implement a program. Although there was general agreement that affected parties needed to be part of the process, there were different viewpoints on how best to insulate the program. The 1985 independent report on alternative methods for financing and managing the nuclear waste program recommended that a federally chartered,

government-owned corporation should be responsible for the siting and construction of the repository in an environment largely free from political influence. The report noted that the organization model would effectively involve key affected parties in siting decisions, which the report called probably the most essential element in ensuring the long-term success of the program. The 1982 report from the Office of Technology Assessment concluded that an independent agency may be the best, if not the only, way to maintain credibility. Some stakeholders agreed with these assessments, noting that DOE was subject to political influences and had lost a lot of its credibility as a result of changes in policy. They stated that an independent organization could bring the credibility necessary to draw key affected parties to an open and transparent discussion on siting. In addition, they stated that an independent organization could be structured to have more financial independence, free of some of the conditions that limited OCRWM in DOE, but they noted that such an organization would still require oversight. Some quasi-governmental organizations have been developed and implemented with varying degrees of success. We have reported on quasi-governmental organizations and issues related to risky behaviors because of their federal sponsorship and the need for adequate oversight.⁴⁴ Still other stakeholders we talked with had different viewpoints, stating that DOE remains an adequate entity for the process, noting that it had successfully sited and built WIPP.

Conversely, some DOE officials and a community representative said that the site selection process is inherently political. They stated that the selection of a site—assuming the candidate sites are technically satisfactory—should be addressed through a political process involving all stakeholders. Some stakeholders suggested that a final decision should be made by Congress if it is to have any lasting authority.

Consistent funding

DOE and state officials and community representatives told us that OCRWM's annual budget was not predictable. OCRWM's annual appropriations varied by as much as 20 percent from year to year, and its average annual shortfall of appropriations from its budget request was about \$90 million each year. Stakeholders, including former DOE officials, said that this makes long-term planning difficult. According to DOE, the original intent of NWPA was to provide consistent funding for a repository

⁴⁴See, for example, GAO, *The Cooperative Model as a Potential Component of Structural Reform Options for Fannie Mae and Freddie Mac*, [GAO-11-33R](#) (Washington, D.C.: Nov. 15, 2010).

and, until this is addressed, the uncertainty of funding may impact the long-term plans for a repository.

According to current and former DOE officials, unless changes are made, the Nuclear Waste Fund might not be sufficient to license, construct, operate, and close a new repository. This is in part because as time goes on, reactors will likely retire and, unless more reactors come on line to replace the retiring reactors, payments to the fund will dwindle. According to DOE, The fund was originally designed to build up an initial surplus to allow it to be self-sustaining as reactors retire.

Continuity of Leadership

People we spoke with, including former DOE officials and industry representatives, told us that continuity of leadership is important for demonstrating commitment to local and state governments and other affected parties and for providing quality management for a long-term program. They said OCRWM operated with a revolving-door style of management that hurt its relationships with local and state government officials. For example, from 1983 through 2010, OCRWM had 17 directors, more than half of them acting directors. Some former DOE officials and industry representatives commented that, as part of DOE, OCRWM was not always a high priority and the quality of managers running the program varied. Some stakeholders said this illustrates a lack of commitment for the program and undermined public trust in the nuclear waste management program. Former OCRWM officials stated that OCRWM had not been consistent in developing positive relationships with the local communities and the state. One former OCRWM director noted the lack of regular meetings with local community groups when he arrived.

Former DOE officials also told us that scientific leadership needs to ensure a consistent focus on complying with the regulations or standards. At WIPP, Sandia National Laboratories was named the lead laboratory in 1975, and its director for science remained in a key leadership position for most of the time DOE worked to open the facility. Former DOE officials said that this helped DOE keep its focus and prioritize its research over the many years of study. In contrast, some stakeholders said the science at Yucca Mountain was not as focused, primarily due to a lack of scientific leadership. For example, the Nuclear Waste Technical Review Board noted that some of the site's early studies were not focused on the performance assessment modeling needed to develop a license application. DOE named Sandia National Laboratories as the lead laboratory for Yucca Mountain in 2007, and former DOE officials and industry representatives credited its leadership with contributing to the completion of the license application, submitted in 2008.

Conclusions

After decades of effort and nearly \$15 billion in spending, DOE succeeded in submitting a license application for a nuclear waste repository. However, since then, DOE has dismantled its repository effort at Yucca Mountain and has taken steps that make the shutdown difficult to reverse. DOE focused on a rapid dismantlement because the administration ended funding on September 30, 2010. Amid uncertainty over whether it had the authority to terminate the Yucca Mountain repository program, DOE terminated the program without formally assessing the risks stemming from the shutdown, including the possibility that it might have to resume the repository effort. Without a formal risk assessment, DOE cannot be assured that it is aware of any risks it is still facing from the shutdown, such as from missed opportunities to preserve institutional knowledge that may be needed in future efforts. Furthermore, as more time passes without a plan for resuming the licensing process at Yucca Mountain, DOE may find it increasingly difficult to resume the process if it reconsiders its decision or is compelled to do so. For example, DOE may find it increasingly hard to gather staff with previous experience at Yucca Mountain, since over time more will retire, relocate, or change careers. Without an adequate closeout plan that included a risk assessment, DOE has left itself vulnerable to losses in both experienced staff and physical property. When DOE eliminated experienced staff, it did not tap them for lessons learned that could be helpful for future efforts. Furthermore, DOE did not complete an inventory of OCRWM property before it closed out the Yucca Mountain site and does not know if equipment was stolen, even though some of its storage sites were breached. Nor did DOE demonstrate that it fully documented the return of any proceeds from sales of OCRWM to the Nuclear Waste Fund. Until these issues are resolved, DOE remains vulnerable to losses and may not be able to ensure it has appropriately managed federal property and funds.

The potential termination of Yucca Mountain also has consequences beyond DOE. On the one hand, it could offer a chance for the nation to reconsider its approach to nuclear waste management, assess emerging technologies, and possibly develop new technologies. On the other hand, termination would once again defer the permanent disposal of some of the nation's most hazardous materials. In doing so, it would essentially restart the search for a permanent solution. DOE has begun this process by charging the Blue Ribbon Commission with evaluating nuclear waste management and disposal alternatives. The commission has not been charged with siting a new repository, the process around which so much opposition has been focused. It is not clear what the nature of the commission's recommendations will be and whether they will endorse a particular final disposal pathway. What is clear, however, is that

developing and implementing any alternative to Yucca Mountain will likely involve considerable time and cost.

Although much time and cost was involved in efforts to develop a repository, similar mistakes have been repeated at different sites over the decades—from Lyons, Kansas, to Yucca Mountain, Nevada. Specifically, efforts have needed the transparency and other features that helped win public support at WIPP, the nation’s only federal geologic repository. They have also needed consistent policies, consistent funding, and a sustainable funding mechanism, and continuity of leadership, which could have kept the efforts focused and improved public acceptance of a repository. The nation’s next investment of significant time and resources may be more successful if these lessons are understood and implemented. Specifically, improved policies, funding, program leadership, and departmental priorities may help to ensure that costly past mistakes are not repeated. Nuclear waste disposal is extremely controversial, and no strategy can guarantee success. However, given the past and the consequences of failure, many knowledgeable sources suggested that the task may require a more predictable funding mechanism and more independence than DOE is able to provide.

Matters for Congressional Consideration

Because successfully resolving the issue of what to do with spent commercial nuclear fuel will likely be a decades-long, costly, and complex endeavor, which can be disrupted by changing views and unpredictable funding, Congress may wish to consider whether

- a more predictable funding mechanism would enhance the federal government’s future efforts to develop and implement a disposal solution for the nation’s spent nuclear fuel, and
- an independent organization, outside DOE, could be more effective in siting and developing a permanent repository for the nation’s nuclear waste.

Recommendations for Executive Action

To help minimize the impact of the rapid shutdown, improve accountability for assets related to Yucca Mountain, and improve the likelihood of success of future nuclear waste management efforts, we recommend that the Secretary of Energy direct the appropriate officials to take the following two actions:

- Assess the risks stemming from the rapid shutdown of Yucca Mountain and develop a preliminary plan to restart the project, in case DOE is required to do so.
- Provide Congress with an inventory of property from the Yucca Mountain repository program, including its value, and an accounting of the property disposed of, the funds received from property transactions, and the disposition of these funds.

Agency Comments and Our Evaluation

We provided DOE and NRC with a draft of this report for their review and comment. DOE provided written comments on March 30, 2011, which are summarized below and reproduced in appendix IV. DOE stated that it strongly disagreed with many of the findings in our draft report and both of our recommendations. NRC provided written comments on March 17, 2011, which are reproduced in appendix V. NRC stated it had no significant comments on our report and thanked us for the time and effort taken to review this important topic. DOE and NRC also provided technical comments, which we have incorporated as appropriate.

In its written comments, DOE stated that it strongly disagreed with many of the findings in the report.

First, DOE questioned the veracity of information supplied by some parties we interviewed. Specifically, DOE stated that some parties we interviewed were “either ill-informed or had self-interested (for example, financial) reason to disagree with DOE’s considered judgments.” In order to address the objectives of our report, we developed a methodology to ensure we obtained a complete, accurate, and balanced view of the Yucca Mountain situation. As part of this approach, it was important to include not only DOE’s viewpoint but that of other knowledgeable officials and individuals. Collectively, we conducted more than 100 interviews with officials from NRC and the Department of Justice as well as representatives from industry, independent organizations, national associations and organizations, academia, and community groups. It is important to note that many of these knowledgeable individuals represent the views of national organizations, are considered experts in their fields,

or have appeared as witnesses before the Blue Ribbon Commission. We spoke with five former DOE OCRWM directors and other former and current DOE officials and staff, some of whom worked on or managed various aspects of DOE's shutdown efforts. Several of these officials and staff provided views that conflicted with those of senior DOE managers. For example, several of these former and current DOE officials expressed concerns or reservations about aspects of DOE's steps to terminate the Yucca Mountain repository project, such as how property was dispositioned. In addition to the officials interviewed, we reviewed thousands of pages of documents and reports. We used information from all of these sources to develop our findings, conclusions, and recommendations.

Second, DOE's comments questioned our assumption that the Yucca Mountain repository would have opened in 2020. We believe that using a 2020 opening date is reasonable for analyzing the effects of a possible termination of the program. As we made clear in our draft report, 2020 was the target opening date that DOE itself established in 2008. In developing this date, as we noted in the draft report, DOE considered the many steps, including legislative and regulatory actions, needed in order to open the repository. At any point in time, DOE could have changed its target date or related assumptions, but it did not. We recognized in our draft report that the opening date for the Yucca Mountain repository was not certain, but DOE did not suggest an alternative date for us to use in our analysis. Furthermore, DOE used its Yucca Mountain repository plans, in which DOE assumes a 2020 opening date, in its annual 2010 assessment of the adequacy of the fee that utilities pay into the Nuclear Waste Fund. More specifically, in its 2010 assessment, DOE stated that the Yucca Mountain repository scenario is the closest "proxy" to an as yet undefined alternative. We have therefore retained this assumption while making clear its limitations.

DOE also questioned our assumption that alternatives to Yucca Mountain would likely take longer to implement and would lead to longer on-site storage and increased costs. DOE stated that the Blue Ribbon Commission will provide advice and make recommendations including alternatives for the storage, processing, and disposal of spent nuclear fuel and high-level nuclear waste, implying that such alternatives could be implemented sooner than the Yucca Mountain repository, but provided no additional information necessary for a meaningful analysis of such alternatives. Moreover, the Blue Ribbon Commission itself, in a March 2011 summary of data it has compiled so far, stated that a mined, geologic disposal facility still seems to be the most widely accepted approach and that most

challenges to nuclear waste disposal are political and social, not technical.⁴⁵ It is not clear whether the Blue Ribbon Commission's recommendations can or will address these challenges, whether DOE will choose to implement any of the Blue Ribbon Commission's recommendations, or how quickly they can be implemented. In contrast, key interim or permanent alternatives to the Yucca Mountain repository that we reviewed—centralized storage, reprocessing, or even a different repository—could take decades to implement. Although DOE stated in its comments that it could begin operations of a centralized storage facility in as little as 6 years, the evidence does not support this. The only effort to open a centralized facility for storing dry casks of commercial spent nuclear fuel—a private industry venture—began about 16 years ago, but continues to face legal and political challenges and at least 3 years of construction before it can begin operations. DOE itself acknowledged that it might only succeed in opening a centralized storage facility in 6 years if various complex statutory, regulatory, siting, construction, and financial issues were expeditiously resolved. As we note in our report, the termination of the Yucca Mountain repository essentially restarts a time consuming and costly process that has already cost nearly \$15 billion through fiscal year 2010. The significant opposition to the Yucca Mountain repository, particularly from Nevada, is not a new development and DOE's pursuit of the repository in the face of this opposition, followed by its citing of this opposition in its decision to terminate the project after more than 20 years, raises great uncertainty and questions about DOE's credibility on this issue.

Third, DOE stated that it acted responsibly in carrying out the Yucca Mountain repository shutdown, including assessing risks and ensuring an orderly project termination. We included in our report DOE officials' descriptions of steps taken to plan the shutdown of the program, such as weekly meetings, but that does not constitute an endorsement of those steps as being complete and comprehensive. As we and DOE's Inspector General noted, DOE's efforts, while significant, were still no substitute for having an approved shutdown plan that includes a risk assessment. Such a plan can establish a shared understanding of goals and the methods to be used to reach them. Furthermore, a comprehensive risk assessment would identify not just the immediate risks of shutting down the program, but the

⁴⁵Blue Ribbon Commission on America's Future, *What We've Heard: A Staff Summary of Major Themes in Testimony and Comments Received by the Blue Ribbon Commission on America's Nuclear Future To Date* (Washington, D.C.: March 2011).

longer-term risks that could impact future waste management efforts. Such a risk assessment would help the department ensure that it has considered all of the likely risks and taken appropriate actions to mitigate possible impacts. Given the significant time and funds invested in the Yucca Mountain effort, and the time and funds likely to be invested in a future effort, it is reasonable to expect that a formal shutdown plan, including a risk assessment, be completed.

Fourth, DOE stated that it complied with governing legal principles for disposal of property related to the Yucca Mountain repository program. However, DOE's property management decisions and its ambitious property disposition schedule raised questions that we sought to highlight in our draft report. For example, the justification that DOE used in selecting the method it used to dispose of its large volume of property, while complying with federal property regulations, seemed "unusual," according to a GSA official with authority over property management in the West. Specifically, DOE used only a small sample of property that could not be sold—three pallets of miscellaneous computer equipment—to document the decision to transfer as abandoned property over 100 truckloads of office furniture and equipment. Also, DOE's statement in its comments to us that our draft report "inappropriately suggests that DOE should have conducted an inventory of the property remaining at the Yucca Mountain site prior to the shutdown of OCRWM," raises another question. A DOE order concerning personal property management directs managers to perform regular physical inventories of personal property that they are responsible for, and the fact that DOE officials could not ascertain whether any property was taken when storage units were broken into seems to illustrate that this was not done.⁴⁶ Finally, DOE provided us with little documentation on certain property that was to be sold at fair market value, with the proceeds returned to the Nuclear Waste Fund. Although we acknowledge that DOE still has to reconcile its contracts, the lack of available documentation—including for one transaction that occurred in October 2009—raises questions about whether DOE documentation is sufficient to support timely oversight of such sales.

Fifth, DOE stated that it took steps during the shutdown that gave DOE the ability to resume an active licensing proceeding, if so required. Our concern is not that DOE would be unable to resume the process but that it

⁴⁶DOE, *Department of Energy Personal Property Management Program*, DOE O 580.1, Chg. 1 (May 8, 2008).

may be significantly slowed, and possibly less successful, with the loss of knowledgeable and experienced staff. It is unclear whether any of these staff would return to work if the licensing should resume. For example, although DOE stated that it took steps to retain federal DOE employees within other DOE units, many left DOE employment. As stated in the report, according to DOE, its Office of Human Capital had information on the location of the federal employees who found other employment within DOE, but DOE officials stated that they were not certain all those former employees would be interested in returning to a licensing effort. DOE officials stated that they could also use staff without Yucca Mountain experience, but the substitution of these staff could jeopardize the quality of the license defense, according to a key Sandia National Laboratories official with management responsibilities over the Yucca Mountain repository. Additionally, under normal attrition rates, as DOE stated in its comments, DOE might be expected to successfully hire and train a few individual employees and successfully integrate them into an existing team, but recruiting an entire new team would, by DOE's own admission, require years of training in technical and regulatory roles.

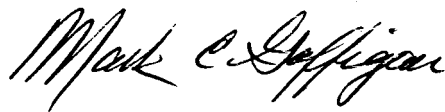
Lastly, DOE disagreed with our two recommendations, but, based on the discussion above, we continue to believe they are appropriate. First, DOE disagreed with our recommendation that it assess the risks stemming from the rapid shutdown of Yucca Mountain and develop a preliminary plan to restart the project. DOE stated that it had already assessed and taken steps to mitigate the key risks associated with the shutdown and cast doubt on any useful purpose being served by conducting an after-the-fact risk assessment. However, as we have stated, DOE management did not approve a formal shutdown plan or a risk assessment, and DOE relied instead on focus groups of DOE staff and meetings between DOE staff and management. As a result, DOE may be unaware of all the risks it faces, particularly long-term impacts on future waste management efforts. In addition, the future of the Yucca Mountain project remains uncertain, and more comprehensive planning and risk assessment could help DOE more efficiently respond with a quality defense of its license application if it is required to resume the license review proceedings.

DOE also disagreed with our recommendation that it provide Congress with an inventory of property from the Yucca Mountain repository program. It stated that an inventory of the property at Yucca Mountain has already been completed, that reconciliation of property transactions and inventory will take place as part of contract close-outs, and that the applicable property disposition procedures were followed. However, the actions DOE took would appear to be insufficient in light of the facts.

Specifically, DOE officials could not ascertain whether any property was taken when storage units at the Yucca Mountain site were broken into, and the department had little documentation on certain property that was to be sold so that the proceeds could be returned to the Nuclear Waste Fund. If DOE had an inventory of its property and an accounting of the property disposed of and funds received, as it should have, compiling this information to provide Congress with a more complete understanding should not be particularly difficult or time-consuming.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, Secretary of Energy, Chairman of NRC, and other interested parties. In addition, the report also will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at 202-512-3841 or gaffiganm@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix VI.



Mark E. Gaffigan
Managing Director
Natural Resources and Environment

Appendix I: Scope and Methodology

To determine the basis for the Department of Energy's (DOE) decision to terminate the Yucca Mountain repository program, we wrote the Secretary of Energy in May 2010 and requested that he provide his input. We also reviewed key actions—and related documents—taken by DOE, the Nuclear Regulatory Commission (NRC), and affected parties, including the June 29, 2010, ruling by NRC's Atomic Safety and Licensing Board that denied DOE's motion to withdraw its license application and court filings related to DOE's termination of the Yucca Mountain repository program. Finally, we interviewed NRC officials about DOE's decision.

To identify the steps DOE has taken to terminate the Yucca Mountain repository program, and their effects, if any, we reviewed DOE budget documents, memoranda, and correspondence. We visited the Office of Civilian Radioactive Waste Management (OCRWM) offices in Las Vegas and the Yucca Mountain site. We also spoke with DOE federal and contractor officials from various offices involved with the termination efforts, including OCRWM, the Office of Nuclear Energy, the Office of Environmental Management, the Office of Legacy Management, the Office of General Counsel, and Sandia National Laboratories. We also reviewed pertinent DOE Office of Inspector General reports and interviewed Inspector General officials. We used our *Standards for Internal Control in the Federal Government*¹ to assess DOE's plans to terminate the Yucca Mountain repository and OCRWM.

To identify the likely major impacts of terminating the Yucca Mountain repository program, we reviewed our prior reports and those of other agencies within the legislative branch issued during the period from 1998 to 2010 (see app. II). We limited the analysis to this period because under the Nuclear Waste Policy Act of 1982 (NWPA), 1998 was the year that DOE was to begin taking custody of spent nuclear fuel from commercial reactors. We felt that the issues raised in these reports would adequately capture a range of impacts associated with a potential closure of Yucca Mountain repository program. We limited the scope of our review to identifying primary impacts, such as increased storage costs. We also spoke with representatives from key national associations and organizations whose members were either affected by the termination of the Yucca Mountain repository program or were in a position to comment on the impact as a result of studies or analyses. These organizations are all

¹GAO, *Standards for Internal Control in the Federal Government*, [GAO/AIMD-00-21.3.1](#) (Washington, D.C.: November 1999).

national in scope or are part of a national organization. They presented views that reflected those of industry, government, academia, and concerned groups. See appendix III for a list of these organizations. To gain a local perspective on the possible impacts of a Yucca Mountain termination, we contacted state and local government officials and community groups near the proposed Yucca Mountain site and near the Waste Isolation Pilot Plant (WIPP) site. We also selected a nongeneralizable sample of nuclear power reactors—three operational reactors, one reactor that is no longer operating but has not yet been decommissioned, and one decommissioned reactor. We interviewed officials from state and local governments, and representatives from industry and local community groups at these sites. We conducted a site visit to the decommissioned reactor, in Oregon. We considered several factors when selecting the reactors. For example, we wanted to include both the oldest and most recently licensed nuclear power reactors because we assumed they would reflect different viewpoints on the impacts of terminating the Yucca Mountain repository program. Table 1 gives details of the reactors we selected.

Table 1: Name, State, NRC Region, and Status of Commercial Nuclear Reactors Sites We Contacted

Reactor site	State	NRC region	Status
Oyster Creek Nuclear Generating Station	New Jersey	Region I	Oldest operating reactor, commercial operations began in 1969
Prairie Island Nuclear Generating Plant	Minnesota	Region III	Operating reactor
Trojan Nuclear Plant	Oregon	Region IV	Decommissioned reactor
Watts Bar Nuclear Plant	Tennessee	Region II	Newest operating reactor, licensed in 1996
Zion Nuclear Power Station	Illinois	Region III	Reactor shut down but not yet decommissioned

Source: GAO analysis of NRC data.

In assessing potential impacts, we used DOE’s estimate of a 2020 opening date for the Yucca Mountain repository in our analysis. DOE’s 2008 estimate for opening the Yucca Mountain repository was 2020, before it took steps to terminate the program. While we recognize this 2020 date

was not certain, we know of no better assumption to meaningfully assess the impact of a termination of the Yucca Mountain repository program.

To identify the principal lessons learned from the various past nuclear waste management efforts and how these might be applied to future efforts, we reviewed our reports and those of other agencies within the legislative branch issued during the period from 1982 to 2010 (see app. II). We limited the analysis to this period because Congress passed the NWPA in 1982. We felt that issues raised in these reports would address a range of key lessons learned from the past nearly 30 years of U.S. nuclear waste management. In addition to this analysis, we reviewed selected reports from the federal government, academia, and industry relevant to lessons learned. We interviewed DOE, NRC, and Sandia National Laboratories officials who had worked on the Yucca Mountain project for their views on principal lessons learned. We also talked to former DOE employees, including five past directors of OCRWM. To obtain stakeholder perspectives on lessons learned, we interviewed representatives from key national associations and organizations, local and state governments, and community organizations. To identify possible lessons learned from the nation's only federal radioactive waste geologic repository at WIPP located in New Mexico, we conducted a site visit at the repository and interviewed officials from DOE, Sandia National Laboratories, and state and local governments. To identify possible lessons learned from the repository experiences at other countries, we reviewed documents from organizations such as the Organisation for Economic Co-operation and Development and the Nuclear Waste Technical Review Board, and we interviewed officials from DOE, Sandia National Laboratories, and the Nuclear Waste Technical Review Board.

We conducted this performance audit from January 2010 to March 2011 in accordance with generally accepted government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: A List of Reports Reviewed

Congressional Budget Office

CBO. *Budget Options, Volume 2*. Publication No. 3191. Washington, D.C.: August 2009.

CBO. *The Federal Government's Responsibilities and Liabilities Under the Nuclear Waste Policy Act*. Testimony statement of Kim Cawley, Chief Natural and Physical Resources, Cost Estimation Unit, before the Committee on the Budget, U.S. House of Representatives. Washington, D.C.: July 16, 2009.

CBO. *Costs of Reprocessing Versus Directly Disposing of Spent Nuclear Fuel*. Testimony Statement of Peter R. Orszag, Director, before the Committee on Energy and Natural Resources, United States Senate. Washington, D.C.: November 14, 2007.

CBO. *The Federal Government's Liabilities Under the Nuclear Waste Policy Act*. Testimony Statement of Kim Cawley, Chief, Natural and Physical Resources, Cost Estimates Unit before the Committee on the Budget, U.S. House of Representatives. Washington, D.C.: October 4, 2007.

CBO. *Budget Options*. Publication No. 2921. Washington, D.C.: February 2007.

CBO. *Budget Options*. Publication. Washington, D.C.: February 2005.

CBO. *Homeland Security and the Private Sector*. Washington, D.C.: December 2004.

CBO. *Cost Estimate: Nuclear Waste Policy Amendments Act of 1999*. Washington, D.C.: June 24, 1999.

CBO. *Cost Estimate: H.R. 45, Nuclear Waste Policy Act of 1999*. Washington, D.C.: May 17, 1999.

CBO. *Cost Estimate: H.R. 1270, Nuclear Waste Policy Act of 1997*. Washington, D.C.: September 25, 1997.

CBO. *Reducing the Deficit: Spending and Revenue Options*. Washington, D.C.: August 1996.

Congressional Research
Service

CRS. *Civilian Nuclear Waste Disposal*. RL33461. Washington, D.C.: April 9, 2010.

CRS. *Energy and Water Development: FY2011 Appropriations*. R41150. Washington, D.C.: March 23, 2010.

CRS. *The Yucca Mountain Litigation: Liability under the Nuclear Waste Policy Act (NWPA) of 1982*. R40996. Washington, D.C.: March 8, 2010.

CRS. *Energy and Water Development: FY2010 Appropriations*. R40669. Washington, D.C.: January 5, 2010.

CRS. *Nuclear Energy Policy*. RL33558. Washington, D.C.: December 10, 2009.

CRS. *Nuclear Waste Disposal: Alternatives To Yucca Mountain*. R40202. Washington, D.C.: February 6, 2009.

CRS. *EPA's Final Health and Safety Standard for Yucca Mountain*. RL34698. Washington, D.C.: October 6, 2008.

CRS. *Radioactive Waste Streams: Waste Classification for Disposal*. RL32163. Washington, D.C.: December 13, 2006.

U.S. Government
Accountability Office

GAO. *Nuclear Waste Management: Key Attributes, Challenges, and Costs for the Yucca Mountain Repository and Two Potential Alternatives*. [GAO-10-48](#). Washington, D.C.: November 4, 2009.

GAO. *Global Nuclear Energy Partnership: DOE Should Reassess Its Approach to Designing and Building Spent Nuclear Fuel Recycling Facilities*. [GAO-08-483](#). Washington, D.C.: April 22, 2008.

GAO. *Yucca Mountain: DOE Has Improved Its Quality Assurance Program, but Whether Its Application for a NRC License Will Be High Quality Is Unclear*. [GAO-07-1010](#). Washington, D.C.: August 2, 2007.

GAO. *Yucca Mountain: Quality Assurance at DOE's Planned Nuclear Waste Repository Needs Increased Management Attention*. [GAO-06-313](#). Washington, D.C.: March 17, 2006.

GAO. *Yucca Mountain: Persistent Quality Assurance Problems Could Delay Repository Licensing and Operation*. [GAO-04-460](#). Washington, D.C.: April 30, 2004.

GAO. *Spent Nuclear Fuel: Options Exist to Further Enhance Security*. [GAO-03-426](#). Washington, D.C.: July 15, 2003.

GAO. *Nuclear Waste: Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project*. [GAO-02-191](#). Washington, D.C.: December 21, 2001.

GAO. *Radiation Standards: Scientific Basis Inconclusive, and EPA and NRC Disagreement Continues*. [GAO/RCED-00-152](#). Washington, D.C.: June 30, 2000.

GAO. *Nuclear Waste: Impediments to Completing the Yucca Mountain Repository Project*. [GAO/RCED-97-30](#). Washington, D.C.: January 17, 1997.

GAO. *Department of Energy: Observations on the Future of the Department*. [GAO/T-RCED-96-224](#). Washington, D.C.: September 4, 1996.

GAO. *Nuclear Waste: DOE's Management and Organization of the Nevada Repository Project*. [GAO/RCED-95-27](#). Washington, D.C.: December 23, 1994.

GAO. *Nuclear Waste: Comprehensive Review of the Disposal Program Is Needed*. [GAO/RCED-94-299](#). Washington, D.C.: September 27, 1994.

GAO. *Nuclear Waste: Foreign Countries Approaches to High-Level Waste Storage and Disposal*. [GAO/RCED-94-172](#). Washington, D.C.: August 4, 1994.

GAO. *Nuclear Waste: Funds Spent to Identify a Monitored Retrievable Storage Facility Site*. [GAO/RCED-93-199](#). Washington, D.C.: September 7, 1993.

GAO. *Radioactive Waste: EPA Standards Delayed by Low Priority and Coordination Problems*. [GAO/RCED-93-126](#). Washington, D.C.: June 3, 1993.

GAO. *Nuclear Waste: Yucca Mountain Project Behind Schedule and Facing Major Scientific Uncertainties*. [GAO/RCED-93-124](#). Washington, D.C.: May 21, 1993.

GAO. *Transition Series: Energy Issues*. [GAO/OCG-93-13TR](#). Washington, D.C.: December 1992.

GAO. *Nuclear Waste: Status of Actions to Improve DOE User-Fee Assessments*. [GAO/RCED-92-165](#). Washington, D.C.: June 10, 1992.

GAO. *Nuclear Waste: DOE's Repository Site Investigations, a Long and Difficult Task*. [GAO/RCED-92-73](#). Washington, D.C.: May 27, 1992.

GAO. *Nuclear Waste: Operation of Monitored Retrievable Storage Facility Is Unlikely by 1998*. [GAO/RCED-91-194](#). Washington, D.C.: September 24, 1991.

GAO. *Nuclear Waste: Quarterly Report as of March 31, 1990*. [GAO/RCED-91-55](#). Washington, D.C.: February 15, 1991.

GAO. *Nuclear Waste: Changes Needed in DOE User-Fee Assessments to Avoid Funding Shortfall*. [GAO/RCED-90-65](#). Washington, D.C.: June 7, 1990.

GAO. *Nuclear Waste: Quarterly Report as of December 31, 1989*. [GAO/RCED-90-130](#). Washington, D.C.: April 30, 1990.

GAO. *Nuclear Waste: Quarterly Report as of September 30, 1989*. [GAO/RCED-90-103](#). Washington, D.C.: March 2, 1990.

GAO. *Nuclear Waste: Quarterly Report on DOE's Nuclear Waste Program as of June 30, 1989*. [GAO/RCED-90-59](#). Washington, D.C.: December 12, 1989.

GAO. *Nuclear Waste: DOE's Budgeting Process for Grants to Nevada Needs Revision*. [GAO/RCED-90-20](#). Washington, D.C.: October 20, 1989.

GAO. *Nuclear Waste: Quarterly Report as of March 31, 1989*. [GAO/RCED-89-178](#). Washington, D.C.: August 14, 1989.

GAO. *Nuclear Waste: Termination of Activities at Two Sites Proceeding in an Orderly Manner*. [GAO/RCED-89-66](#). Washington, D.C.: February 6, 1989.

GAO. *Nuclear Waste: Repository Work Should Not Proceed until Quality Assurance Is Adequate*. [GAO/RCED-88-159](#). Washington, D.C.: September 29, 1988.

GAO. *Nuclear Waste: Fourth Annual Report on DOE's Nuclear Waste Program*. [GAO/RCED-88-131](#). Washington, D.C.: September 28, 1988.

GAO. *Nuclear Waste: DOE Should Provide More Information on Monitored Retrievable Storage*. [GAO/RCED-87-92](#). Washington, D.C.: June 1, 1987.

GAO. *Nuclear Waste: Status of DOE's Implementation of the Nuclear Waste Policy Act*. [GAO/RCED-87-17](#). Washington, D.C.: April 15, 1987.

GAO. *Nuclear Waste: Institutional Relations under the Nuclear Waste Policy Act of 1982*. [GAO/RCED-87-14](#). Washington, D.C.: February 9, 1987.

Office of Technology
Assessment

OTA. *Managing the Nation's Commercial High-Level Radioactive Waste*. OTA-O-171. Washington, D.C.: March 1985.

OTA. *Managing the Nation's Commercial High-Level Radioactive Waste (summary)*. Washington, D.C.: April 1982.

Appendix III: Organizations We Obtained Input From

AREVA Inc.
Association of American Railroads
Carlsbad Department of Development (New Mexico)
Carlsbad Mayor's Office (New Mexico)
City of Red Wing, Office of the Mayor (Minnesota)
Clark County Department of Comprehensive Planning (Nevada)
Columbia County Board of Commissioners (Oregon)
Columbia Riverkeeper
Council of State Governments, Midwestern Office
Eastern Environmental Law Center
Energy Communities Alliance
EnergySolutions
Exelon Nuclear
Grandmothers, Mothers and More for Energy Safety (New Jersey)
Institute for Energy and Environmental Research
International Nuclear Associates
Las Vegas Chamber of Commerce
Minnesota Department of Commerce
National Academy of Sciences
National Association of Regulatory Utility Commissioners
National Conference of State Legislatures
Natural Resources Defense Council
New Jersey Department of Environmental Protection
New Jersey Environmental Federation
New Mexico Environment Department
North American Water Office
Nuclear Energy Information Service
Nuclear Energy Institute
Nuclear Information and Resource Service

**Appendix III: Organizations We Obtained
Input From**

Nuclear Waste Strategy Coalition
Nuclear Waste Technical Review Board
Nye County (Nevada)
Ocean County Sheriff's Department (New Jersey)
Oregon Conservancy Foundation
Oregon Public Power Coalition
PECOS Management Services, Inc.
Portland General Electric
Prairie Island Indian Community
PSEG Nuclear
Public Utility Commission of Oregon
South Carolina Department of Health and Environmental Control
Southern Nuclear
Southern States Energy Board
Southwest Research and Information Center
State of Nevada Agency for Nuclear Projects
Tennessee Environmental Council
Tennessee Valley Authority
URS Corporation
U.S. Chamber of Commerce
Western Interstate Energy Board
Xcel Energy

Note: We also obtained input from other organizations not listed here.

Appendix IV: Comments from the Department of Energy



Department of Energy

Washington, DC 20585

March 30, 2011

Mr. Gene Aloise
Director, Natural Resources and Environment
United States Government Accountability Office
441 G Street, NW
Washington, DC 20548

Subject: DOE's Response to GAO's Conclusions and Technical Misstatements (GAO-11-229)

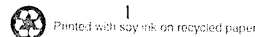
Dear Mr. Aloise:

The Department of Energy strongly disagrees with many of the conclusions drawn in GAO's Draft Report. In some areas, those conclusions are based upon misapprehensions of fact. In others, the Draft Report appears to accept on faith assertions by parties who are either ill-informed or have self-interested (for example, financial) reason to disagree with DOE's considered judgments.

More generally, the Draft Report appears premised on two mistaken assumptions: *first*, that the Yucca Mountain repository would have opened, on a date certain (notwithstanding the many hurdles still remaining before it); and, *second*, that any alternative to the Yucca Mountain repository will take longer to implement and therefore lead to longer storage times at reactor sites and increased costs. To the contrary, there was considerable uncertainty whether the Yucca Mountain repository would *ever* have opened – let alone when. Among other things, the project would have required new legislation, an NRC license, and many additional permits. And it suffered over many years from persistent community opposition. In shutting down the Yucca Mountain Project, DOE is committed to pursuing better, more workable alternatives. To that end, the Secretary has established a Blue Ribbon Commission on America's Nuclear Future to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle. The Commission will provide advice and make recommendations on issues including alternatives for the storage, processing, and disposal of spent nuclear fuel and nuclear waste. Its interim report is due in July of this year and its final report is due by January 2012.

The Department has acted responsibly in carrying out the Yucca Mountain Project shutdown and will continue to do so in pursuing new options with the guidance of the Blue Ribbon Commission. Accordingly, it is unwarranted to assume, as the Draft Report appears to do throughout, that the shutdown of Yucca Mountain will impair the Government's ability to meet responsibly its waste management obligations.

That said, the Department welcomes GAO's efforts to glean lessons from the Yucca Mountain experience to guide future waste management efforts. And it appreciates the opportunity to



comment on GAO's Draft Report, while nevertheless feeling it necessary to register substantial disagreement with many of the conclusions drawn therein.

A. Shutdown Planning

From senior management on down, the Department was committed to closing down the Yucca Mountain Project in a responsible manner, and it successfully did so. DOE's senior management worked closely with the Department's Office of Civilian Radioactive Waste Management (OCRWM) and other relevant offices to plan for and implement the shutdown. This included ensuring that scientific information and other records were preserved, that DOE's Licensing Support Network collection of more than 30 million pages was maintained and remained online via the NRC portal, that all Project property was properly disposed of, that contracts requirements were met, and that federal employees were given priority placement within the Department or provided other assistance in finding new employment. All these activities were based on a master plan developed by management and overseen and supported on an ongoing basis by appropriate personnel within OCWRM and other relevant offices within the Department.

Nevertheless, the Draft Report concludes that DOE lacked an "adequate closeout plan." Draft Report at 43. This "finding" rests on GAO's apparent belief that "DOE did not consistently follow federal policy and guidance for planning . . . the shutdown." *Id.* at 14. That is simply inaccurate.

1. Risk Assessment

The Draft Report asserts that "DOE terminated the program without assessing the risks stemming from the shutdown, including the possibility that it might have to resume the repository effort."¹ *Id.* at 43. That assertion ignores the substantial attention DOE gave to risk assessment and the steps it took in response. Indeed, elsewhere the Draft Report itself specifically notes that DOE considered and addressed these risks. For example, the Draft Report acknowledges statements by DOE officials that "although they did not complete a formal risk assessment, they *did* consider the possible risks of shutting down the program . . . including the risk to DOE's ability to resume the license review process, if necessary." *Id.* at 22-23 (emphasis added). Even more to the point, as the Draft Report specifically acknowledges, such consideration led to numerous steps by DOE to mitigate those risks. *Id.* at 23. Those steps included: (1) "not cancel[ing] its management and operating contract, in part so it would be easier to resume licensing activities if it were required to do so;" (2) "help[ing] federal employees at OCRWM to remain at DOE, in part to facilitate efforts to reconstitute the Yucca Mountain work force, should the need arise;" and (3) consideration by DOE's Office of the General Counsel of "planning and risk issues as the program was being dismantled." It is therefore clear – and apparently was to GAO – that DOE did carefully consider the risks inherent

¹ The Draft Report further asserts that, "[a]lthough uncertainty [sic] over whether it had the authority to terminate the Yucca Mountain repository program, DOE terminated the program." Draft Report at 43. To the contrary, DOE conducted a thorough legal review prior to terminating the program and proceeded only when confident it had the legal authority to do so.

in shutting down the Yucca Mountain Project and took prudent action to abate such risks as it identified.

2. Ensuring an Orderly Project Termination

a. Existence of a Shutdown Plan

The Department acted to ensure that the Yucca Mountain Project closed down in a responsible manner. These efforts have largely been successful, and included significant work to plan for and implement the shutdown.

For example, in the Draft Report's own words, the Department undertook "extensive efforts" to "preserve data related to its licensing efforts, as well as other scientific information relevant to the storage or disposal of high-level waste and spent nuclear fuel." *Id.* at 15. Likewise, the shutdown ensured all Project property was properly disposed of, that contracts requirements were met, and that federal employees were given priority placement within the Department or provided other assistance in finding new employment. All these activities were based on a draft master plan developed by DOE management and overseen and supported on an ongoing basis by appropriate personnel within OCRWM and other relevant offices.

To ensure that the Department closed down the Yucca Mountain Project in a responsible manner that minimized harm to federal employees – and did so within the timeframe necessary to account responsibly for the likelihood of no funding in Fiscal Year 2011 – the then-Under Secretary of Energy, Dr. Kristina Johnson, held weekly meetings with the senior management of OCRWM and other DOE units. Those units included the Office of Environmental Management, the Office of Legacy Management, the Office of Nuclear Energy, the Office of the Chief Financial Officer, the Office of the Chief Human Capital Officer, the National Nuclear Security Administration and the Office of the General Counsel. The Draft Report acknowledges these meetings, *see id.* at 22, but fails to appreciate the extent to which this process ensured that shutdown efforts were reviewed and coordinated by the Department's senior leaders. As part of this process, for example, the Under Secretary and affected Departmental offices executed a Memorandum of Understanding (MOU) clearly delineating each office's roles and responsibilities for functions continuing after the closure of OCRWM.²

The Draft Report recognizes the view of DOE officials involved "that DOE met its September 30, 2010 deadline for closure and believed that despite the difficult task, the shutdown was orderly." *Id.* at 15. As if to contradict this, however, the Draft Report observes that, "while OCRWM's Yucca Mountain Project activities have ceased, several termination tasks are still ongoing, such as disposing of federal property and closing down contracts and subcontracts." *Id.* To the extent this is meant to imply that the shutdown has been less than successfully executed, that implication is misguided. Rather, as any responsible organization would, DOE appropriately prioritized its shutdown activities. By September 30, 2010, all activities that needed to be completed by the close of the Fiscal Year had in fact been completed. It was entirely appropriate to defer until after September 30, 2010 activities that did not need to be

² DOE, Memorandum of Understanding: Closure of RW and Maintenance of the Yucca Mountain Site (September 16, 2010).

completed by the end of the Fiscal Year. Moreover, it is significant that the Draft Report does not, because it cannot, identify a single unrealized benefit that would have resulted from DOE adopting “formal” plans instead of the working plans that it actually implemented.

b. Adequacy of Shutdown Staffing

The Draft Report questions whether the shutdown effort was appropriately staffed. Specifically, it asserts that “[i]n contrast to the data preservation efforts, efforts to retain Yucca Mountain project staff were minimal.” *Id.* at 16. “Staff were encouraged to seek other employment and given no incentive to stay with OCRWM to assist with the shutdown. Some DOE and contractor officials told us that retaining key staff during the shutdown process would have been helpful.” *Id.* at 16-17.

This misunderstands an important part of DOE’s shutdown planning and execution. Requiring additional staff to remain in their previous posts throughout the shutdown process would have been inconsistent with the important goal of assisting OCRWM employees to find new positions in the Department by September 30, 2010. Moreover, GAO fails to identify any specific aspect of the shutdown process that might have been improved had OCRWM retained a larger staff than it did in the months leading up to September 30, 2010. Further, OCRWM worked with management of other DOE offices to delay the departure of essential OCRWM personnel to their new positions where circumstances permitted.

B. Property Disposition

Contrary to the impression created by the Draft Report, DOE’s decisions regarding property disposition were made with great care and with a clear understanding of – and in compliance with – the governing legal principles.

The Draft Report asserts that DOE is “vulnerable to losses in . . . physical property” and “may not be able to ensure it has appropriately managed federal property and funds.” *Id.* at 43. However, the Draft Report itself demonstrates that DOE successfully disposed of unneeded property in a financially sound, common-sense manner that complied with applicable federal property regulations. *See id.* at 18-21. Likewise, the Draft Report criticizes DOE for “not complet[ing] an inventory of OCRWM property before it closed out the Yucca Mountain site,” adding that DOE “does not know if equipment was stolen, even though some of its storage sites were breached.” *Id.* at 43. But the facts contained in the Draft Report show that an inventory of property at the Yucca Mountain site was completed when necessary and the equipment allegedly at-risk was actually protected by multiple layers of security. *See id.* at 20. The Draft Report also asserts that DOE failed to “demonstrate that it fully documented the return of any proceeds from sales of OCRWM [property] to the Nuclear Waste Fund.” *Id.* at 43. However, the Draft Report shows that DOE did document the initial stage of this reimbursement process and acknowledges that full documentation would be available once certain contracts are closed out. *See id.* at 20. Finally, the Draft Report criticizes DOE’s property disposition documentation as “limited.” *Id.* at 17. Yet it fails to identify any actual flaws or insufficiencies in that documentation.

The apparent basis for all these misconceptions is provided under the misleading heading “DOE Used Expedited Procedures to Dispose of Property, but Its Documentation Was Limited.” *Id.* This heading implies that the process employed by the Department for the disposal of property was inadequately documented and somehow flawed. That is simply not the case. Indeed, virtually all of the facts discussed in this section of the Draft Report demonstrate that DOE followed both the letter and intent of the federal property regulations by disposing of property in a financially sound, common-sense manner.

To facilitate an accurate understanding of DOE’s property disposition procedures, DOE has organized its response around four issues: (1) Property Disposition Prior to the Shutdown of OCRWM; (2) Property Disposition During the Shutdown of OCRWM; (3) Property at the Yucca Mountain Site; and (4) Return of Certain Proceeds to Nuclear Waste Fund.

1. Property Disposition Prior to the Shutdown of OCRWM.

The Draft Report acknowledges that the property disposition procedures DOE used during the shutdown, which began in 2010, were consistent with procedures followed in other circumstances. *See id.* Specifically, the Draft Report acknowledges that they were “similar to those used to transfer excess property in 2009.” *Id.* The 2009 transfers primarily involved office furniture that was excess to OCRWM’s needs after the transition of OCRWM’s management and operation (M&O) contractor in April of that year. During this transition, the Project vacated the majority of its leased offices and downsized from over 1,000 office suites to approximately 100 office suites. As a result of this downsizing, OCRWM had a significant quantity of excess furniture that was ultimately transferred to other DOE sites. The Draft Report contains no finding that this process was in any way flawed.

2. Property Disposition During the Shutdown of OCRWM

The Draft Report describes the typical screening process that an agency must follow, as dictated by the General Services Administration (GSA), unless the agency declares that the property is “abandoned.” *See id.* at 17-18. The Draft Report then explains that federal regulations allow an agency to employ an alternative property disposition process in “common-sense” situations where it “might not make sense to transfer or sell” the property. *Id.* at 18. As the Draft Report explains:

[F]ederal regulations also allow for an agency to declare its property abandoned and to dispose of the property on its own. To do so, the agency must first make a determination that the property has no commercial value or that the estimated cost of its continued care and storage could exceed the estimated proceeds from its sale.

Id.

Subsequently, the Draft Report acknowledges DOE officials’ explanation that declaring the unneeded property as abandoned and transferring it within the Department “was the most efficient pathway” because this allowed the Department to “reduce landlord costs by emptying

buildings of their equipment, save on utilities and security, and in some cases, reduce lease costs.” *Id.* at 18. As the Draft Report recognizes, through this process, approximately 80 truckloads of office furniture and equipment were transferred to DOE’s Hanford Site, which saved that site about \$2.1 million. Furthermore, the Draft Report cites a GSA official who correctly stated that “the determination of how to apply the regulation is left up to the agency and the fact that DOE found a way to reuse the equipment addressed the overall intent of the federal property regulations.” *Id.* at 19. The same GSA official also explained that, “[a]ccording to the abandonment regulation, DOE had to determine that its property had no commercial value or that the cost of its continued care and handling exceeded the estimated proceeds from the sale.” *Id.*

DOE did in fact determine that the property it planned to abandon had no commercial value. The Draft Report itself demonstrates that this determination by DOE was carefully reasoned and appropriately documented. The Draft Report summarizes the analysis used by the Department in reaching this determination. *See id.* Namely, storing the furniture and equipment costs the Department about \$680 per day. OCRWM had reviewed the GSA database and found examples of three pallets of equipment that were similar to the material that OCRWM had, but GSA had not received any offers for the asking price of only \$10. In light of this, OCRWM determined that the care, storage, and processing of its property “far surpassed the estimated proceeds from sale.” *Id.* According to the Draft Report, “DOE officials stated that their documentation was sufficient for regulatory purposes.” *Id.*

In support of its contrary assertion, the Draft Report contains a single statement by a GSA official who opined that, “agencies determine on their own the level of analysis required to declare property abandoned, but . . . DOE’s limited analysis did not seem to address the large volume or variety of property that DOE was transferring.” *Id.* As the first part of that statement indicates, under the abandonment regulations, the level of analysis required to declare property abandoned is left to the discretion of the agency. Those regulations specifically provide that a federal agency does not need to report abandonment or destruction of excess personal property to GSA.³ DOE had discretion regarding the abandonment of property and the implementation of the property regulations. It exercised that discretion responsibly, and GSA does not have supervisory, oversight, or enforcement responsibilities over abandoned property.

3. Property at the Yucca Mountain Site

The Draft Report states that although very little of the property from the Yucca Mountain site had been transferred, DOE “may have lost some of it to break-ins.” *Id.* Further, the Draft Report asserts that the Department did not have a good inventory of the property at Yucca Mountain. For support, the Draft Report quotes a DOE official as saying broken locks had been found on at least three occasions and that, “some property may have been taken, but without an inventory they could not be certain what, if anything, was missing.” *Id.* at 20. In short, the Draft Report inappropriately suggests that DOE should have conducted an inventory of the property remaining at the Yucca Mountain site prior to the shutdown of OCRWM, and that if such an inventory had been conducted DOE would know whether any property was in fact missing.

³41 C.F.R. § 102-36.305.

It is important to understand that, unlike the property at OCRWM's Las Vegas offices, the majority of the property located at the Yucca Mountain site was not slated for disposal and in fact remains in DOE custody. As such, the Department determined that it was not necessary to conduct a complete inventory of the property located at the site because the property did not need to be moved from the site prior to shutdown and would remain in DOE's control at a secure site.⁴ Appropriately, during the shutdown of OCRWM, the primary focus was placed on disposing of the property in the Las Vegas offices, because the Project had physically to vacate those offices. In addition, the Department took numerous steps to transfer responsibility and oversight of the Yucca Mountain site including the property and its ultimate disposition to other DOE organizations ensuring continuity of stewardship. The surface facilities at the site are part of DOE's Nevada National Security Site (NNSS) and remain under DOE control after the shutdown of OCRWM. As such, DOE determined that the inventory and disposal of property at the site could be deferred until after the shutdown of OCRWM. As the Draft Report acknowledges, an inventory of the property at the site has now been completed and the property will be screened through the Energy Asset Disposal System. *See id.* at 20.

Furthermore, the Department did in fact take reasonable steps to protect the property remaining at the Yucca Mountain site by placing it either in locked storage buildings or trailers or in the tunnel, which was shut down and secured behind a fence and locked gate. In addition, it strictly limited the distribution of keys to specified responsible officials. Finally, the storage buildings, trailers, and the tunnel are all located on a remote corner of the NNSS, which is itself a heavily guarded facility with restricted access. In light of these multiple layers of security, DOE determined that placing additional guards outside of the storage buildings, trailers and tunnel entrance at the site would not be a prudent use of resources. This determination was entirely appropriate.

4. Return of Certain Proceeds to Nuclear Waste Fund

The Draft Report notes that DOE guidance prohibits the transfer of certain property under the abandonment regulation and instead requires that it be sold at fair market value, with the proceeds to be deposited into the Nuclear Waste Fund. *See id.* However, the Draft Report's assertion that DOE failed to demonstrate appropriate reimbursement of the Nuclear Waste Fund for property sold for fair market value is premature at best. As the Draft Report acknowledges, DOE did provide documentation showing that it "directed [its] contractor to sell property and reimburse OCRWM." *Id.* As it further acknowledges, documentation showing that such sales did in fact occur and tracking the flow of proceeds is *not yet available*, but "would become available during the contract close-out process." *Id.* Given that the contract has not yet been closed out, any implication that the Nuclear Waste Fund has not been appropriately reimbursed is premature.

⁴ See Memo to File from James. W. Hollrith, Former Director Office of Construction and Site Management, OCRWM, (January 31, 2011).

C. Ability to Resume the Licensing Proceeding

As DOE has made clear in public filings,⁵ it could and would resume an active licensing proceeding if required to do so. DOE has taken numerous steps to ensure that it can support an active licensing proceeding, provided Congress appropriates it funds with which to do so. Nonetheless, the Draft Report draws the unwarranted conclusion that “DOE may find it increasingly difficult to resume the [licensing] process if it . . . is compelled to do so.” *Id.* at 43. In support of this conclusion, the Draft Report makes several assertions, each of which is addressed below.

1. Preservation of Scientific Knowledge

First, the Draft Report asserts that DOE “missed opportunities to preserve institutional knowledge that may be needed in future efforts.” *Id.* That is simply not the case. Indeed, the Draft Report recognizes that “DOE has taken extensive efforts to preserve data related to its licensing efforts, as well as other scientific information relevant to the storage or disposal of high-level waste and spent nuclear fuel.” *Id.* at 15. As the Draft Report further recognizes, those efforts included “maintaining a collection of 3.6 million documents pertaining to its license application” and “taking steps to maintain several other databases for the use of future scientists, the largest of which is called the Records Information System.” *Id.* at 16. As the Draft Report recognizes, the databases DOE is preserving “generally consist of relevant scientific information related to the storage of high-level waste and spent nuclear fuel” and the Records Information System “will be usable and preserved in the same quality as it existed under OCRWM and for 25 years after the termination of the Yucca Mountain program.” *Id.*

Additionally, DOE preserved core federal capabilities in the areas of science and program management by retaining key OCRWM personnel within other Departmental units. Specifically, DOE’s Office of Nuclear Energy (NE) expanded its Office of Used Nuclear Fuel Disposition Research and Development to ensure that the expertise that had been developed within OCRWM could be maintained within the Department to conduct the scientific research required to implement recommendations from the Blue Ribbon Commission on America’s Nuclear Future. These actions would also facilitate a resumption of the licensing process, if DOE were ordered to do so.

2. Maintenance of the Licensing Support Network (LSN)

Second, the Draft Report asserts that “[i]t is not clear . . . who will be responsible for preserving the [LSN] or whether it will continue to be accessible by scientists and the public, particularly in light of budget pressures and changing priorities over a long period of time.” *Id.*

To the contrary, DOE has made it clear that its Office of Legacy Management will be responsible for preserving DOE’s LSN collection.⁶ Furthermore, DOE has stated that it will

⁵ See DOE Response in Opp. to Petitioners’ Motion for P.I., *In re Aiken County*, D.C. Cir., No. 10-1050, at 16-17, 19-20 & nn. 10, 11, and Exhibit 1 thereto (April 23, 2010).

⁶ See DOE, Memorandum of Understanding: Closure of RW and Maintenance of the Yucca Mountain Site (September 16, 2010).

continue to make its LSN collection electronically accessible through the NRC's LSN portal until all appeals related to the Yucca Mountain proceeding have been exhausted. DOE has further committed that after the Yucca Mountain proceeding has been terminated, or if the NRC website portal is shut down prior to such termination, DOE will preserve the LSN in accordance with the determinations rendered by the National Archives and Records Administration (NARA) which is the agency vested with authority to determine whether records should be archived on a temporary or permanent basis. DOE has recommended that a 100-year retention period would be appropriate for the LSN, although, again, NARA will make the final determination.

Thus, while DOE cannot control whether the NRC eliminates accessibility to the LSN via the NRC portal, the Department is committed to taking numerous steps to ensure that its LSN collection will be preserved. As a result, DOE will retain the capability to search the DOE LSN collection and provide responsive documents.

3. Contractor's "Knowledge Retention" Proposal

Third, the Draft Report implies that DOE missed an opportunity to preserve institutional knowledge when it refused to accept a \$2.8 million contractor proposal to prepare "knowledge retention packages." *Id.* at 25. The Draft Report characterizes that proposal as "an effort to mitigate the threat of the irrecoverable loss of expert knowledge as staff members depart the Yucca Mountain repository program." *Id.* Yet the Draft Report fails to cite a single example of such "irrecoverable" knowledge and – significantly – skips over the fact that DOE required that all scientific and technical materials be sufficiently documented *in writing* to allow use by other scientific and technical experts without the need for recourse to the originator. As DOE explained to GAO, the Department requires that scientific knowledge be documented in writing because it has long been aware that the original authors of scientific and technical materials might not be available for the duration of the proceeding.

Indeed, the Draft Report itself appropriately recognizes that DOE management reviewed the contractor proposal and determined that the suggested tasks were far too expensive and wholly unnecessary for DOE to comply with its obligations to preserve existing records and scientific information that would be needed were the proceeding ever to resume.⁷ The Draft Report should also acknowledge, but does not, the contractor's inherent self-interest in suggesting the work at issue. Simply put, the proposed "knowledge retention" plan was, in the eyes of the experienced DOE managers who reviewed it, a multi-million dollar boondoggle, entirely unnecessary at this stage of the application proceeding.⁸

⁷ See DOE, "Office of Civilian Radioactive Waste Management (OCRWM) Contracting Officer Direction to Stop Contract License Application Contract Tasks to USA Repository Services LLC (USA RS), Contract Number DE-RW0000005" (June 7, 2010).

⁸ Examples of the wasteful and unnecessary tasks suggested by the M&O contractor included developing recordings, orientation materials, and sketches that may have provided no benefit if the licensing proceeding were restarted. See USA RS, "Contract No. DE-RW0000005 – USA Repository Services LLC (USA RS) Response to U.S. Department of Energy (DOE) Request for Information," Attachment C (May 24, 2010).

4. Ability to Reconstitute Staff

Fourth, the Draft Report asserts that during the shutdown process, DOE “eliminated experienced staff” without “tap[ping] them for lessons learned that could be helpful for future efforts,” *id.* at 43, and that this “loss of staff with experience at Yucca Mountain could hinder the license review if the process is resumed,” *id.* at 23. This assertion ignores the fact that the Department took significant steps to assist OCRWM employees to find alternate employment with the Department. The Department tailored these steps in order to maintain core federal capabilities in the science and program management areas that would be required (and, as a result of DOE’s efforts, available), in the event DOE were ordered to resume the license application process. Additionally, in terms of non-federal employees, the vast majority of contractor personnel who worked on the Yucca Mountain Project did so under contracts with either Sandia National Laboratories or USA RS. Those contracts have not been terminated, and through them the Department could access substantial contractor expertise in the event the licensing proceeding was to resume.

The Draft Report further asserts that “DOE may find it increasingly hard to gather staff with previous experience at Yucca Mountain, since over time more will retire, relocate, or change careers.” *Id.* at 43. Clearly, the possibility of staff “retir[ing], relocat[ing], or chang[ing] careers” would exist even had the Project not been terminated. Likewise, the Draft Report questions DOE’s ability to reassemble its licensing team based on concerns raised by some DOE, NRC, and Sandia National Laboratories officials. *See id.* at 24. As documented above, however, DOE has taken steps to mitigate such concerns, for example by retaining key OCRWM employees at DOE and maintaining its contracts with Sandia National Laboratories and USA RS. These concerns should also be balanced against the reality, as noted above, that the license application was developed under institutional controls requiring extensive and transparent documentation. In sum, DOE has taken steps to ensure that, while there would be some delay, it could resume the licensing proceeding if so ordered, provided Congress appropriates it money with which to do so.

D. Timing and Cost of Alternatives to Yucca Mountain

The Draft Report asserts that “any alternative to Yucca Mountain will likely involve considerable time and cost,” and catalogues a variety of negative impacts that may allegedly arise because DOE’s decision will supposedly cause “delay” in removing materials from existing locations. *Id.* at 43. This is an assumption running through the Draft Report. GAO appears to presume that any alternative to Yucca Mountain will take longer to implement, resulting in longer storage times at reactor sites, and will cost more than Yucca Mountain. This presumption, however, is speculative and unfounded.

1. Prolonged Storage at Reactor Sites

The Draft Report asserts that DOE’s decision to terminate the Project “will likely prolong storage at reactor sites,” which could lead to a chain of negative impacts including “increase[d] on-site storage costs,” increased “taxpayer burden by increasing the substantial liabilities that DOE has already incurred due to on-site storage at commercial nuclear reactors,” “[reduced]

opportunities for industry and local communities” to use existing storage sites for alternative uses, and “increase[d] opposition to expansion of the nuclear industry.” *Id.* at 30-32. These assertions are premised on the assumption that the Yucca Mountain Project would have resulted in an operating repository by 2020. In fact, the opening of Yucca Mountain was always subject to numerous contingencies, including legislative and regulatory actions, that might well have prevented it from opening by 2020 or any other date.⁹ Moreover, these assertions ignore the possibility that alternatives to Yucca Mountain, such as interim storage, could well result in waste being transferred from sites more quickly than it would have had DOE continued to pursue a repository at Yucca Mountain.¹⁰

The Draft Report’s speculation regarding the likelihood of prolonged storage is also premised upon a significant factual error – one that misrepresents not only DOE’s position but also a prior GAO Report. Specifically, the Draft Report cites a 2009 GAO Report (GAO-10-48) for the mistaken proposition that, “according to dozens of experts, even a federal centralized interim storage facility is likely to take 17 to 33 years to plan and implement. . . . If such a facility were initiated in 2011, this makes the most likely initial opening date somewhere from 2029 to 2045.” Draft Report at 29. In fact, the 2009 Report attributes this estimate to a single unnamed centralized storage expert, not dozens of experts.¹¹ The Draft Report then states that “DOE generally agreed with our findings in [the 2009] Report.” *Id.* at 29 n.33. This statement is misleading. Specifically, the single expert estimate in the 2009 Report immediately followed a statement by DOE “that if various complex statutory, regulatory, siting, construction, and financial issues were expeditiously resolved, a centralized facility nuclear waste could begin operations as early as 6 years after its development began.”¹² DOE did not address the estimate attributed to the unnamed expert in its comments on the 2009 Report since its disagreement had already been acknowledged in that Report itself.

The current Draft Report further speculates that storage at utility sites will be prolonged because “communities may be even less willing to host spent nuclear fuel repositories or other storage sites in the future” due to the termination of the Project. *Id.* at 33. Here the Draft Report fails to recognize the significance of DOE’s experience with the Waste Isolation Pilot Plant (WIPP), where there has been significant community support for the construction and operation of a waste repository. DOE’s pursuit of improved alternatives to Yucca Mountain will be informed by its successful experience with WIPP. It will likewise be aided by the expertise and imprimatur of the distinguished Blue Ribbon Commission the Department has convened to recommend alternative approaches. For these reasons among others, the Draft Report’s assertion that community acceptance will prove elusive in the future is speculative at best.

DOE is confident that pursuing improved alternatives to Yucca Mountain will result in a better approach to waste disposal. Moreover, it is entirely possible that the DOE may actually be able to accelerate the schedule by which it is able to remove spent fuel from utility sites. The Draft Report’s speculation to the contrary is thus premature and unfounded.

⁹ See Brief for Respondents, *In re Aiken County*, D.C. Cir., No. 10-1050, at 65-67 (January 3, 2011).

¹⁰ See DOE Response in Opp. to Petitioners’ Motion for P.I., *In re Aiken County*, D.C. Cir., No. 10-1050, at 16 (April 23, 2010).

¹¹ GAO-10-48 November 2009, page 30.

¹² GAO-10-48 November 2009, page 30.

2. Costs of Alternatives to Yucca Mountain

The Draft Report asserts that, “[a]s a result of the termination of the Yucca Mountain repository program, DOE may also need to seek additional funding for an alternative repository.” *Id.* at 30. This statement appears to imply that an increase in the waste fee will be necessary. This is pure speculation, and it is contrary to the Secretary’s recent determination that the waste fee need not be altered at this time.

It also ignores the very real possibility that Yucca Mountain might *never* have been operational and that an alternative might ultimately cost less and not require an increase in the fee. As noted, the opening of Yucca Mountain was always subject to numerous contingencies that might well have prevented it from opening by 2020 (or any other date). The effect of such contingencies on the amount of funding necessary to open Yucca Mountain is unknown. Moreover, speculation that an alternative disposal solution would cost more than Yucca Mountain is premature at least until the Blue Ribbon Commission issues its recommendations and actions have been taken in light of those recommendations.

The Draft Report further asserts that that “[i]f DOE were to pursue an alternative repository, it is not certain that the [Nuclear Waste Fund] will have built up a sufficient surplus to site, license, construct, and operate it.” *Id.* at 30. This is not only speculative; it evinces a fundamental misunderstanding of the law. DOE is required by the Nuclear Waste Policy Act of 1982, as amended (NWPA), to conduct a review every year precisely to determine whether more (or fewer) funds are necessary. Thus, if more funds ultimately are required, there is an adequate statutory mechanism to address that issue. The Draft Report expresses concern that DOE can collect funds pursuant to that statutory mechanism only “while nuclear reactors are still operating,” apparently suggesting that the Fund may experience a shortfall when nuclear reactors stop operating. *Id.* This, too, is speculative. In short, nothing in the Draft Report suggests, or would support the suggestion, that the existing statutory mechanism is inadequate.

E. DOE’s Response to GAO’s Recommendations for Executive Action

In light of the foregoing, the Department respectfully submits that neither of the Draft Report’s two recommendations for executive action is warranted.

First, the Draft Report recommends that DOE “[a]ssess the risks stemming from the rapid shutdown of Yucca Mountain and develop a preliminary plan to restart the project, in case DOE is required to do so.” *Id.* at 45. As more fully set forth above, DOE has already assessed (and taken steps to mitigate) the key risks associated with the Project shutdown process. DOE therefore doubts whether any useful purpose would be served by expending additional funds to engage in a formalistic, after-the-fact “risk assessment.”

Second, the Draft Report recommends that the Department “[p]rovide Congress with an inventory of property from the Yucca Mountain repository program, including its value, and an accounting of the property disposed of, the funds received from property transactions, and the disposition of these funds.” *Id.* at 45. The Department believes no useful purpose would be

served by engaging in such an exercise at this time and further believes this would be a waste of scarce funds. Moreover, the Department does not believe it has an obligation to provide a separate accounting, especially since an inventory of the property at the Yucca Mountain site has already been completed and reconciliation of property transactions and inventory will take place as part of contract close-outs. Finally, as discussed more fully above, the Department notes that the applicable property disposition procedures were followed. Accordingly, the Draft Report's recommended inventory and accounting would add little if anything of value to the public record.

F. Technical Misstatements

Footnote 1 of the Draft Report incorrectly states that "spent nuclear fuel . . . when it is accepted for disposal, is considered to be high-level waste." *Id.* at 3 n.1. The NWPA draws a clear distinction between spent nuclear fuel and high-level radioactive waste and this distinction does not disappear simply because DOE accepts spent nuclear fuel for disposal.¹³

The Draft Report misuses the statutory-defined term "surplus" several times. *Id.* at 17-20. "Surplus" property has a specific meaning in the Federal Property and Administrative Services Act of 1949. That statute defines "surplus" as "excess property that the [GSA] Administrator determines is not required to meet the needs or responsibilities of all federal agencies."¹⁴ The term "excess," which is also a term of art, is defined as "property under the control of a federal agency that the head of the agency determines is not required to meet the agency's needs or responsibilities."¹⁵ In this case, the GSA Administrator had not made a determination regarding the DOE property in question. At the end of page 17 of the Draft Report, and the beginning of page 18, the use of the term "surplus" is appropriate, since that discussion addresses GSA's responsibilities. However, the term "unnneeded" should be substituted for the following references to "surplus": (1) page 17, two references in the third paragraph; (2) page 18, third paragraph; (3) page 19, second paragraph, and (4) page 20, first and second paragraph.

The Draft Report states that DOE "did not establish independent scientific panels . . . that might have given affected parties more confidence" in certain technologies included in the license application. *Id.* at 36. In fact, the NWPA established the Nuclear Waste Technical Review Board (NWTRB) for the sole purpose of providing independent scientific and technical oversight of DOE's disposal program,¹⁶ but the Draft Report gives this important oversight mechanism only passing notice that underplays its importance in maintaining transparency. The NWTRB is an independent federal agency consisting of a panel of 11 experts in science and engineering nominated by the National Academy of Sciences and appointed by the President.¹⁷ Between NWTRB's inception and the shutdown of the Project, the NWTRB received approximately \$45 million of Congressional appropriations,¹⁸ published dozens of studies and reports on a wide

¹³ Nuclear Waste Policy Act of 1982 (hereinafter "NWPA"), sec. 2(12), 42 U.S.C. § 10101(12); *see also* Atomic Energy Act of 1954 (hereinafter "AEA"), sec. 11dd, 42 U.S.C. § 2014(dd).

¹⁴ 40 U.S.C. § 102(10).

¹⁵ 40 U.S.C. § 102(3).

¹⁶ NWPA, sec. 503, 42 U.S.C. § 10263.

¹⁷ NWPA, sec. 502, 42 U.S.C. § 10262.

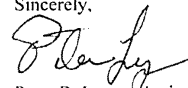
¹⁸ OCRWM, Office of Business Management, Summary of Program Financial & Budget Information, at slide 9 (January 31, 2010), *available at*: <http://www.energy.gov/media/ocrwm-budget-summary.pdf>.

**Appendix IV: Comments from the Department
of Energy**

range of scientific and technical aspects of the Project,¹⁹ and corresponded regularly with DOE regarding the Project.²⁰ In addition, DOE itself convened independent scientific and technical panels through the use of expert elicitations and independent experts. For example, two of the most extensive elicitations conducted by DOE were the Probabilistic Seismic Hazard Analysis (PSHA) and the Probabilistic Volcanic Hazard Analysis (PVHA). Both the PSHA and the PVHA were formal expert elicitations with panels of independent technical experts. The PSHA was convened to analyze the potential effects of seismicity on the region surrounding Yucca Mountain, and the PVHA was convened to analyze the potential effects of volcanic activity in that region. The results of both of these expert elicitations are included in the Yucca Mountain License Application.²¹

The Draft Report also states that DOE “did not consult” with the local community in developing technological solutions for the Project. *Id.* at 36. This is wrong. For example, a local Nye County technical representative was collocated with DOE technical staff in DOE facilities. In addition, DOE held numerous public workshops and public meetings on a broad range of topics.

Sincerely,



Peter B. Lyons, Acting
Assistant Secretary for
Nuclear Energy

¹⁹ NWTRB Reports, available at: <http://www.nwtrb.gov/reports/reports.html>.

²⁰ NWTRB Correspondence, available at: <http://www.nwtrb.gov/corr/corr.html>.

²¹ See References cited by U.S. Department of Energy for Yucca Mountain License Application, available at: <http://www.nrc.gov/waste/hlw-disposal/yucca-lic-app/references.html>.

Appendix V: Comments from the Nuclear Regulatory Commission

March 17, 2011

Ms. Janet Frisch, Assistant Director
Natural Resources and Environment
Government Accountability Office
701 5th Avenue, Suite 2700
Seattle, WA 98104

Dear Ms. Frisch:

I would like to thank you for the opportunity to review and comment on the March 2011 draft of the U.S. Government Accountability Office (GAO) report, "Commercial Nuclear Waste: Effects of a Termination of the Yucca Mountain Repository Program and Lessons Learned," (GAO-11-229). The U.S. Nuclear Regulatory Commission has reviewed the draft report and has no significant comments. We appreciate the time and effort that you and your staff have taken to review this important topic.

Should you have any questions about our response, please contact Mr. Jesse Arildsen of my staff at (301) 415-1785 or at Jesse.Arildsen@nrc.gov.

Sincerely,

/RA/ R. W. Borchardt

R. W. Borchardt
Executive Director
for Operations

Appendix VI: GAO Contact and Staff Acknowledgments

GAO Contact

Mark E. Gaffigan, (202) 512-3841 or gaffiganm@gao.gov

Staff Acknowledgments

In addition to the individual named above, Janet Frisch, Assistant Director; Arkelga Braxton; Kevin Bray; Penney Harwell-Caramia; Robert S. Fletcher; Anne Rhodes-Kline; Steve Lipscomb; Mehrzad Nadji; Risa Pavia; Robert Sánchez; Benjamin Shouse; Vasiliki Theodoropoulos; Mary Welch; and Arvin Wu made key contributions to this report.

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