



April 2017

COMMERCIAL NUCLEAR WASTE

Resuming Licensing of the Yucca Mountain Repository Would Require Rebuilding Capacity at DOE and NRC, Among Other Key Steps

Why GAO Did This Study

Spent nuclear fuel from commercial power reactors can pose risks to humans and the environment, if not properly contained, and is a source of billions of dollars of liabilities. In 2008, DOE applied to NRC for approval to build a geologic repository at Yucca Mountain in Nevada for permanent disposal of spent nuclear fuel and high-level waste. As part of NRC's licensing process to review DOE's application and potentially approve construction, NRC initiated a public hearing—or adjudication—with DOE, NRC staff, and nonfederal parties. However, in March 2010, after announcing plans to terminate its proposal for Yucca Mountain, DOE submitted a motion to NRC to withdraw its application. In September 2011, NRC formally suspended the adjudication.

GAO was asked to examine the likely steps needed to resume the Yucca Mountain licensing process. This report examines (1) the actions that took place after DOE submitted its motion to withdraw its application and any plans by DOE or NRC to resume the licensing process, and (2) the likely key steps needed to resume and complete the process and the factors that may influence these steps' success.

GAO reviewed federal laws and documents; interviewed DOE and NRC officials and contractors; and interviewed or received written remarks from 15 of the 17 nonfederal parties.

What GAO Recommends

GAO is not making any recommendations. NRC generally agreed with GAO's findings. DOE provided comments but did not indicate whether it agreed with the findings.

View [GAO-17-340](#). For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

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What GAO Found

After the Department of Energy (DOE) submitted its March 2010 motion to withdraw its license application to construct a geologic repository at Yucca Mountain, DOE and the Nuclear Regulatory Commission (NRC) largely dismantled their capabilities to carry out the rest of NRC's licensing process. This process includes a technical review by NRC staff and adjudication. DOE's and NRC's dismantlement steps included, among other things, eliminating organizations and funding used to carry out the licensing process; canceling the NRC staff's technical review; and vacating NRC's customized hearing facility, which NRC had leased and equipped specifically for the Yucca Mountain adjudication. At the same time, DOE and NRC took steps to preserve relevant data, including millions of documents. DOE and NRC had mostly completed the dismantlement steps before NRC formally suspended the adjudication and the licensing process in September 2011. After an appeals court ruled in 2013 that NRC had acted against federal law by halting its review, from 2014 through 2016, NRC resumed some aspects of the licensing process, such as completing its technical review and report on DOE's Yucca Mountain application, but not the adjudication. As of late 2016 and early 2017, DOE and NRC said they have no formal plans to resume the adjudication, which, according to an NRC estimate from 2014, could take up to 5 years to resume and complete. More recently, the administration announced plans to request funding to resume the licensing.

Based on analysis of documents and interviews, GAO identified four key steps that would likely be needed to resume and complete the licensing process. The steps include actions by, among others, NRC's five-member Commission and the adjudication's parties: DOE, NRC staff, and 17 non-federal parties likely to be affected by the proceeding. The likely key steps GAO identified are:

1. The Commission and parties receiving direction to resume the licensing process, and the Commission deciding on the timing and other details, so NRC and parties can identify their funding needs for the adjudication.
2. Rebuilding organizational capacity, including, as needed, recruiting personnel to recreate DOE's, NRC's, and nonfederal parties' project offices; obtaining legal, scientific, or other experts for the adjudication; and rebuilding physical infrastructure. Also at this step, DOE and NRC may need to update key documents used for the licensing process.
3. Reconvening the parties and completing the remaining phases of the adjudication, including witness depositions and evidentiary hearings.
4. Carrying out the process's remaining steps, including the Commission's final decision on whether to authorize construction of the repository.

A number of factors could affect the time needed to resume and complete the licensing process. For example, DOE's ability to bring back its expert witnesses to defend its license application during the adjudication could affect this time frame. Because of the volume and complexity of information, former DOE witnesses contacted by GAO generally estimated that it could take a new expert at least a year to prepare to serve as a DOE witness—about twice as long as the former witnesses said they would need themselves.

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Abbreviations

ASLBP	Atomic Safety and Licensing Board Panel
DOE	Department of Energy
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
LSN	Licensing Support Network
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act of 1982

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April 26, 2017

The Honorable Greg Walden
Chairman
Committee on Energy and Commerce
House of Representatives

The Honorable Fred Upton
Chairman
Subcommittee on Energy
Committee on Energy and Commerce
House of Representatives

The Honorable John Shimkus
Chairman
Subcommittee on Environment
Committee on Energy and Commerce
House of Representatives

Spent nuclear fuel—radioactive waste material from commercial nuclear power reactors—can pose serious risks to humans and the environment and is a source of billions of dollars of financial liabilities for the U.S. government. According to the National Research Council and others, if not handled and stored properly, this material can spread contamination and cause long-term health concerns in humans or even death.¹ The nation’s inventory of spent nuclear fuel from commercial nuclear power reactors is generally stored where it was generated at operating reactor sites, immersed in pools of water designed to cool and isolate it from the environment and then encased in protective dry-cask storage systems. Nearly 80,000 metric tons of this waste is being stored at 75 reactor sites in 33 states. The Department of Energy (DOE) estimates the amount of commercial spent nuclear fuel will increase to about 140,000 metric tons over the next several decades.

The Nuclear Waste Policy Act of 1982 (NWSA) directed DOE to investigate sites for a federal deep geologic repository to dispose of spent

¹See, for example, National Research Council, *Safety and Security of Commercial Spent Nuclear Fuel Storage* (Washington, D.C.: 2006).

nuclear fuel and high-level nuclear waste.² The NWPA also established an Office of Civilian Radioactive Waste Management in DOE to investigate potential sites and oversee the licensing for the construction of a permanent geologic repository, long considered the safest and most secure option for disposing of spent nuclear fuel.³ A 1987 amendment to the NWPA directed DOE to focus its investigation of potential sites on a single location, the Yucca Mountain site, about 100 miles northwest of Las Vegas, Nevada, in a remote area of the Mojave Desert. DOE spent three decades and billions of dollars investigating the area in and around Yucca Mountain, making it, according to some experts, one of the most studied sites in the world. In 2002, DOE recommended the site to the President, and on the President's recommendation, Congress approved Yucca Mountain as the location for the nation's geologic repository.

In June 2008, DOE submitted a license application to the Nuclear Regulatory Commission (NRC) for authorization to construct a permanent geologic repository at Yucca Mountain, which DOE proposed to open by 2020. DOE's application included detailed information on the design and scientific and engineering analyses of the proposed repository's safety and other attributes. NRC, an independent federal agency, is responsible for evaluating DOE's application and determining whether to authorize construction of the proposed repository and—as separate and subsequent actions—license DOE to operate and eventually close the repository.

NRC's licensing process to determine whether to authorize construction of the Yucca Mountain repository primarily consists of (1) a technical review by NRC staff of DOE's license application and Environmental Impact Statement (EIS) for the proposed repository and (2) licensing adjudication before NRC Atomic Safety and Licensing Boards (licensing boards). Outside entities that would likely be affected by the proceeding, such as counties and Indian tribes near the Yucca Mountain site, may

²In addition to commercial spent nuclear fuel, DOE is responsible for disposing of highly radioactive wastes from the nation's nuclear weapons program and spent nuclear fuel from naval and other noncommercial origins.

³Reports by the National Academy of Sciences, including *The Disposal of Radioactive Waste on Land* (Washington, D.C.: September 1957), have identified disposal in a geologic formation as the safest and most secure method of isolating commercial spent nuclear fuel and other types of nuclear waste. Subsequent National Academy of Sciences reports have continued to endorse geologic isolation and have suggested that engineered barriers, such as corrosion-resistant waste containers, can provide additional protection. International consensus also supports geologic disposal.

petition these boards for approval to participate in the adjudication and to file one or more “contentions” to formally challenge the safety, environmental, or other aspects of the proposed repository. After taking preliminary steps to evaluate whether the entities and contentions meet NRC’s acceptance criteria, among other preliminary steps, the licensing boards’ administrative judges may hold evidentiary hearings on the contentions. The boards are ultimately responsible for making NRC’s initial decision about whether safety and environmental laws and regulations have been satisfied, in light of the contentions admitted into the adjudication, and whether to authorize construction of the proposed repository.⁴

In October 2008, NRC issued a public hearing notice announcing the opportunity for outside entities to petition for approval to participate as a recognized party to the Yucca Mountain licensing adjudication and to file contentions for possible adjudication at evidentiary hearings.⁵ In May 2009, the three licensing boards that were convened to rule on outside entities’ petitions announced that they had accepted, for future consideration at hearings, about 300 contentions filed by 8 of the 10 outside entities that the boards determined had legal standing to

⁴In addition to the NWP, the National Environmental Policy Act (NEPA) and NRC’s regulations provide requirements and standards regarding the safety, environmental, and other aspects of the repository. In particular, under NEPA, federal agencies generally are to evaluate the likely environmental effects of projects they are proposing by preparing either an Environmental Assessment or a more detailed EIS. 42 U.S.C. § 4332(2)(c). Part 51 provides that NRC is to determine whether it is practicable for it to adopt the EIS prepared by DOE for the proposed Yucca Mountain repository, 51 C.F.R. § 51.26(c) and Part 63 provides requirements and standards specific to Yucca Mountain, see e.g., 10 C.F.R. §§ 63.112, 63.113.

⁵NRC regulations require that entities seeking admission as a party to the Yucca Mountain licensing adjudication demonstrate that they have standing to participate in the proceedings. Entities seeking party status are also required to demonstrate their compliance with NRC’s requirements related to the Licensing Support Network and to submit one or more admissible contentions. NRC regulations also provide that the 10 Nevada and California counties considered “affected units of local government,” as defined by the NWP, as well as affected Indian tribes, were not required to demonstrate standing. Also, a governmental entity can seek admission into the adjudication as an “interested governmental body,” rather than a party, allowing the entity to participate on others’ contentions rather than submitting its own.

participate as parties to the adjudication.⁶ These parties included the State of Nevada; counties designated in the NWPA as “affected units of local government” near the Yucca Mountain site; and other nonfederal entities. Additional nonfederal entities were admitted as parties later in the adjudication, eventually bringing the number of nonfederal parties to 17.⁷ In addition, the parties to the Yucca Mountain licensing adjudication included two federal entities—the NRC staff, as a key technical reviewer of DOE’s license application, and DOE, which, as the applicant, was responsible for defending its license application or altering aspects of its application and underlying proposal for the repository.⁸

With NRC’s October 2008 public hearing notice, the licensing adjudication was underway. However, on March 3, 2010, during the adjudication’s initial discovery phase, DOE submitted, to a fourth licensing board convened to manage discovery, a motion to withdraw its license application “with prejudice” and to exclude Yucca Mountain from further

⁶The 10 entities admitted in May 2009 included 8 that were admitted as parties to the licensing adjudication: (1) Clark County, Nevada; (2) the 4 Nevada counties of Churchill, Esmeralda, Lander, and Mineral (jointly); (3) Inyo County, California; (4) Nuclear Energy Institute; (5) Nye County, Nevada; (6) the state of California; (7) the state of Nevada; and (8) White Pine County, Nevada. Also in May 2009, 2 other Nevada counties—(9) Eureka and (10) Lincoln—were admitted as interested governmental bodies. For the purposes of this report, we are referring to parties and interested governmental bodies as “parties” to the adjudication.

⁷In addition to the 10 nonfederal parties admitted in May 2009, 2 other nonfederal entities—(11) the Joint Timbisha Shoshone Tribal Group and (12) the Native Community Action Counsel—were admitted as parties in August 2009, after demonstrating their compliance with Licensing Support Network requirements. Later in the adjudication, 5 additional nonfederal entities were admitted as parties—(13) Aiken County, South Carolina; (14) Prairie Island Indian Community; (15) National Association of Regulatory Utility Commissioners; (16) the state of South Carolina; and (17) the state of Washington—for a total of 17 nonfederal parties. With the admission of these parties, additional contentions were accepted into the adjudication. However, the total number of admitted contentions fluctuated throughout the adjudication, as licensing boards accepted new contentions or dismissed existing ones in response to parties’ filings.

⁸According to DOE and NRC officials, alterations to the license application could come about in different ways. For example, DOE could agree to make changes voluntarily to settle with parties on their contentions. According to NRC, DOE could also elect to make changes to its application based on its interactions with a licensing board, the five-member NRC Commission, or the NRC staff.

consideration as a repository site.⁹ DOE's motion to withdraw its license application followed announcements by DOE in the previous year that it planned to terminate its proposal for Yucca Mountain and study other disposal options. In the March 2010 withdrawal motion, DOE announced that it no longer considered Yucca Mountain a workable option for disposal of spent nuclear fuel and high-level defense waste. DOE also noted in its withdrawal motion that the President had directed, and Congress had appropriated funding for DOE to establish a Blue Ribbon Commission to evaluate and recommend alternative disposal options for these wastes. Subsequently, the licensing board denied DOE's withdrawal motion but, in September 2011, formally suspended the licensing adjudication.¹⁰

You asked us to examine the Yucca Mountain licensing process and the steps likely needed to resume the process. This report (1) examines the actions that took place after DOE submitted its motion to withdraw its license application in March 2010, and DOE and NRC's plans, if any, to resume the licensing process, and (2) identifies the key steps that would likely be needed for DOE, NRC, and the nonfederal parties involved in the licensing process to resume and complete the process, and the factors that may influence the success of these steps.

To examine the actions that took place after DOE submitted its withdrawal motion in March 2010, we reviewed the NWPA and other federal laws and NRC regulations governing its licensing process for Yucca Mountain. We reviewed NRC's hearing record for the Yucca Mountain licensing adjudication, including directives and decisions by NRC's licensing boards and motions and other filings by the parties. We also reviewed other documents, including reports from the DOE and NRC Inspectors General; agencies' budgets or spending reports for fiscal years 2009 through 2016; and correspondence between DOE and NRC or with

⁹Motion to Withdraw, U.S. Department of Energy's. In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04, Mar. 3, 2010. In an earlier motion from February 1, 2010, DOE requested that the licensing board stay the licensing proceeding, noting that, in the administration's fiscal year 2011 budget released that day, the President had directed DOE to discontinue its license application and had proposed to eliminate all funding for the development of Yucca Mountain. Subsequently, the licensing board temporarily stayed the adjudication, which remained suspended until late June 2010.

¹⁰Memorandum and Order (suspending Adjudicatory Proceeding), Atomic Safety and Licensing Board, Docket No. 63-001-HLW, ASLBP No. 09-892-HLW-CAB04, Sept. 30, 2011.

others. To identify plans to resume the licensing process, we interviewed former officials from DOE's Office of Civilian Radioactive Waste Management and current officials from DOE's offices of Nuclear Energy, General Counsel, and Legacy Management. At NRC, we interviewed officials from the Atomic Safety and Licensing Board Panel (ASLBP) and from the offices of the Secretary of the Commission, Commission Appellate Adjudication, General Counsel, and Nuclear Material Safety and Safeguards. Furthermore, we interviewed contractors at two federally funded research and development centers involved with Yucca Mountain activities—Sandia National Laboratories in New Mexico and California and the Center for Nuclear Waste Regulatory Analyses in Texas.¹¹

To identify the key steps that would likely be needed for DOE, NRC, and the nonfederal parties involved in the licensing process to resume and complete the process, as well as the factors that may influence their success in carrying out the key steps, we reviewed the NWPA, NRC regulations, and other documents, and we interviewed current and former DOE and NRC officials and contractors. Furthermore, we interviewed representatives of 14 of the 17 nonfederal parties to the Yucca Mountain licensing adjudication about the likely key steps, if the licensing process resumes, and received written remarks from 1 additional nonfederal party, for a total of 15 nonfederal parties responding out of the 17.¹² In reporting on these nonfederal parties' responses, we refer to like statements made by representatives of 2 or 3 of the parties as comprising "a few" of the 15 nonfederal parties we interviewed or that provided us written remarks. Like statements by 4 to 6 of these parties comprise "some," 7 to 11 comprise "several," and 12 or more comprise "most" or "all." In addition, we contacted a non-generalizable sample of 12 of the 48 former witnesses previously selected by DOE to testify during the adjudication and help defend DOE's license application. We received responses from 10 of these former witnesses, who were responsible for helping defend DOE against 133 of the 187 contentions (or about 71 percent) that a

¹¹Both are federally funded research and development centers—contractor-operated centers intended to meet long-term federal research and development needs and support their sponsoring agencies' missions. Sandia National Laboratories supports DOE's nuclear weapons-related missions but also conducted research into Yucca Mountain and played a lead role in coordinating Sandia's and other DOE laboratories' efforts to prepare the license application for Yucca Mountain. The Center for Nuclear Waste Regulatory Analyses has been the NRC staff's main technical contractor for Yucca Mountain-related activities since the 1990s.

¹²The two remaining nonfederal parties did not reply to our request for an interview or did not agree to an interview or provide us written remarks.

licensing board determined would be addressed during an initial discovery phase of the adjudication. The witnesses provided us written answers to e-mailed questions about the likely steps for resuming their role in the adjudication if given the opportunity, among other topics. The views of the former DOE witnesses and the nonfederal party representatives cannot be generalized to those who were not part of our review.

We conducted this performance audit from March 2016 to April 2017 in accordance with generally accepted government auditing standards. Those 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.

Background

Between 1983, when the NWPA became law, and 2008, when DOE submitted its license application for Yucca Mountain, DOE spent nearly \$15 billion to investigate developing a repository.¹³ Most of DOE's and NRC's expenditures related to Yucca Mountain have come from appropriations to DOE and NRC from the Nuclear Waste Fund. This fund was established under the NWPA as a mechanism for commercial generators of spent nuclear fuel—and, ultimately, ratepayers—to pay their share of the cost for the permanent geologic repository. Between 1983 and 2014, the mechanism was funded by a fee of one-tenth of a cent per kilowatt-hour of nuclear-generated electricity, collected by the federal government from electric power companies. However, these collections were halted in May 2014.¹⁴ As of the end of fiscal year 2016,

¹³See GAO, *Commercial Nuclear Waste: Effects of a Termination of the Yucca Mountain Repository Program and Lessons Learned*, [GAO-11-229](#) (Washington, D.C.: Apr. 8, 2011). This figure is in constant fiscal year 2010 dollars. From fiscal year 2009 to fiscal year 2016, DOE reported receiving an additional \$1.4 billion in appropriations for nuclear waste management.

¹⁴Under the NWPA, DOE is to determine how much industry should contribute to the Nuclear Waste Fund, annually review the established amount, and evaluate whether the collection of the fee will provide sufficient revenue. In 2013, a federal appeals court found that DOE was unable to conduct a legally adequate assessment of the ongoing spent nuclear fuel fee assessed on electricity generated and sold by civilian nuclear power reactors. The court directed DOE to propose to Congress a reduction in this fee to \$0 from 1 mil (0.1 cents) per kilowatt-hour of electricity generated and sold. Such a proposal became effective on May 16, 2014. In August 2014, DOE collected the remaining ongoing fees. In fiscal years 2015 and 2016, no ongoing fees were assessed, according to a November 2016 Nuclear Waste Fund audit by KPMG.

the Nuclear Waste Fund's balance was about \$36 billion.¹⁵ According to an NRC document, the agency has received about \$580 million in appropriations from the Nuclear Waste Fund since 1990 for its activities to prepare for and carry out the Yucca Mountain licensing process. This includes activities by the NRC staff's main technical contractor, the Center for Nuclear Waste Regulatory Analyses, as well as other contractors that supported NRC's Yucca Mountain activities.

Since 1998, spent nuclear fuel has been a source of costly liabilities for the government. Under NWPA authority, in the 1980s, DOE entered into contracts with utilities, reactor operators, and other owners and generators of commercial spent nuclear fuel. As part of these contracts, DOE agreed to take title to and begin disposing of this spent nuclear fuel beginning no later than January 31, 1998, when DOE expected to begin receiving waste at Yucca Mountain.¹⁶ Because DOE has not yet begun taking possession of this waste, since 1998 owners and generators of spent nuclear fuel have won judgements against the United States in the Court of Federal Claims or settled with the government. As of the end of fiscal year 2016, the federal government had reimbursed owners and generators about \$6.1 billion in connection with such lawsuits, and DOE estimates that future federal liability for litigation related to storing spent nuclear fuel could amount to \$24.7 billion.¹⁷

Established by Congress in 1974, NRC regulates commercial nuclear power plants and other uses of nuclear materials through licensing, inspection, and enforcement of its requirements. NRC is headed by a five-member commission, including a chairman, appointed by the President and confirmed by the Senate for 5-year terms. The chairman is NRC's principal executive officer and is responsible for its administrative, organizational, budgetary, and other functions. As NRC's highest

¹⁵According to KPMG's November 2016 audit, investments and related interest accounted for nearly all of the approximately \$36 billion. Not included in this figure is about \$2.8 billion in fees for spent nuclear fuel and associated interest receivable from owners and generators of commercial spent nuclear fuel.

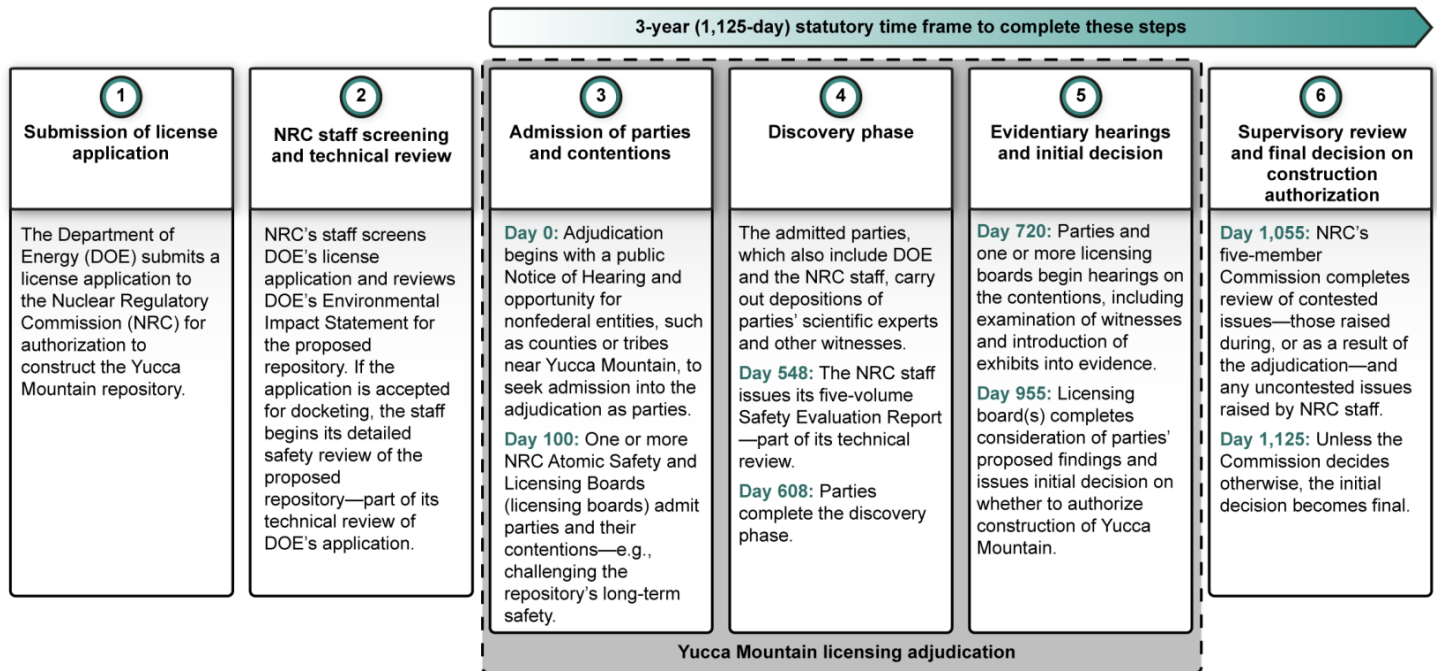
¹⁶The act, in effect, prohibits NRC from issuing a commercial license to a nuclear facility that lacks such a contract.

¹⁷In its *Fiscal Year 2016 Agency Financial Report*, DOE estimated that the total liability, including amounts paid to owners and generators of spent nuclear fuel, as of the end of fiscal year 2016, to be about \$30.8 billion. After deducting the approximately \$6.1 billion paid to these owners and generators, DOE estimated the remaining liability to be about \$24.7 billion.

decision-making body, the Commission sets NRC's policies, approves NRC's allocations of its budget and staffing resources, and maintains supervisory authority over NRC proceedings, including licensing adjudications. NRC is responsible for regulating the design, construction, operation, and eventual closure of a geologic repository at Yucca Mountain. NRC's regulations, among other things, specify safety requirements and incorporate the U.S. Environmental Protection Agency's (EPA) environmental protection standards for a proposed repository at Yucca Mountain and outline the process for the Yucca Mountain repository licensing (see app. 1).

The NWPA and NRC regulations require NRC to review DOE's license application and issue a final decision approving or disapproving construction authorization for Yucca Mountain within 3 years, unless the Commission notifies Congress that it intends to extend this time frame by up to 12 months. After an initial screening by NRC staff to determine whether to accept DOE's application for technical review, the 3-year statutory time frame begins with the public notice announcing the opportunity to petition NRC for approval to participate in the licensing adjudication and ends with NRC's final agency decision on whether to authorize construction of the repository. The NRC staff's technical review and the licensing adjudication comprise the bulk of the activities that are to be carried out during the statutory time frame. In particular, the adjudication includes various phases to admit parties and contentions; carry out discovery, including depositions of parties' scientific experts or other witnesses; and conduct evidentiary hearings on the admitted contentions, including attorney-led examinations of witnesses (see fig. 1).

Figure 1: Nuclear Regulatory Commission’s Licensing Review Process and Statutory Time Frame for Construction Authorization of the Yucca Mountain Repository



Source: GAO analysis of NRC regulations. | GAO-17-340

Shortly after DOE submitted its license application for Yucca Mountain on June 3, 2008, the NRC staff conducted an initial screening of DOE’s application, as required in NRC regulations, and reviewed DOE’s EIS for the repository. In September 2008, the staff found that the application was sufficient for NRC to carry out its review and, therefore, should be “docketed.”¹⁸ Subsequently, as part of its technical review, the staff began a detailed safety review of the license application. This review followed more than two decades of interactions between DOE and NRC staff while DOE studied the Yucca Mountain site and prepared its license application. The NRC staff and NRC’s contractors at the Center for Nuclear Waste Regulatory Analyses also carried out other scientific and technical investigations, for example, to assess DOE’s studies of the site.

After DOE submitted its application, the NRC staff determined that it would be “practicable” for NRC to adopt DOE’s EIS for the repository;

¹⁸73 Fed. Reg. 53,284 (Sept. 15, 2008).

however, supplemental information related to the repository's possible impacts on groundwater was required.¹⁹ Subsequently, DOE agreed to prepare an EIS supplement by fall 2009. For the detailed safety review, the staff evaluated the scientific and engineering bases presented in DOE's license application and supporting analyses to determine whether DOE's proposal for the repository's design, performance, and operation complied with NRC's regulations for the issuance of a construction authorization. Under NRC's plan for reviewing the license application, the staff would issue its views on DOE's regulatory compliance in a five-volume Safety Evaluation Report. Under NRC regulations, this report was required to be available during the licensing adjudication.

Under the Commission's rules, the Secretary of the Commission—the NRC official who provides executive management services to support the Commission and to implement Commission decisions—is to issue notice of a public hearing when the Commission finds that a hearing is required in the public interest before the Commission decides whether to authorize construction. In September 2008, the Secretary published notice in the Federal Register; subsequently, NRC's ASLBP appointed the three licensing boards in January 2009 to admit the parties and contentions. The ASLBP, under the direction of the Commission, conducts all licensing and other hearings, primarily through appointed individual Atomic Safety and Licensing Boards or single presiding officers, and provides administrative and technological support to these boards. The licensing boards, each with three administrative judges, reviewed the petitions and contentions, considered various motions from the parties, and issued decisions and case management directives for the adjudication. The

¹⁹Pursuant to Section 114(f) of the NWSA and NEPA requirements, DOE prepared a final EIS in February 2002 to evaluate the potential environmental impacts of construction, operation, and permanent closure of a high-level radioactive waste geologic repository at Yucca Mountain. In April 2004, DOE announced its intent to develop a separate EIS for the Nevada rail alignment and supplement the rail corridor analyses in the 2002 repository EIS. On June 3, 2008, DOE submitted the original 2002 EIS with its license application followed by a supplemental EIS on June 16, 2008. In accordance with the NWSA and NRC regulations at 10 C.F.R. § 51.109, NRC staff determined it was practicable to adopt the 2002 and 2008 EISs, but further supplementation was needed for the EISs to adequately characterize the potential for contamination of groundwater and contamination through surface discharges of groundwater. See, Nuclear Regulatory Commission, *U.S. Nuclear Regulatory Commission Staff's Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain* (Sept. 5, 2008).

ASLBP appointed the fourth licensing board in June 2009 to consider discovery and other preliminary matters.²⁰

In general, except for affected units of local government and affected Indian tribes, entities admitted into the Yucca Mountain licensing adjudication were required to show that they had legal standing to participate; these entities could do so by showing, among other things, that they would likely suffer a “distinct and palpable” harm from the proposed repository. The entities also were required to submit one or more admissible contentions that presented a genuine factual or legal dispute related to the proposed repository or that identified a deficiency in DOE’s license application or EIS for the repository, among other requirements.

Of the approximately 300 contentions admitted into the Yucca Mountain licensing adjudication in May 2009, about 220 were from a single party—the state of Nevada—and primarily challenged DOE’s license application and EIS as failing to demonstrate that the proposed repository’s safety protections would, over the long term, prevent radioactive material from contaminating the environment in and around Yucca Mountain. Other parties’ admitted contentions also challenged the proposed repository’s safety, as well as other aspects. For example, some of the contentions from parties representing Indian tribes identified the potential for the repository and its operations to damage culturally significant areas. In other cases, contentions from parties representing county governments near the Yucca Mountain site identified possible negative effects on local tourism or potential budgetary costs—such as for highway improvements or first-responder services—if spent nuclear fuel is transported through their counties to the site.

In anticipation of the large number of technical documents related to the license application that would be produced by DOE and the other parties, according to an NRC document, NRC created a Web-based Licensing Support Network (LSN). The LSN was one of NRC’s principal tools to help it meet the 3-year statutory time frame by replacing the classic discovery exchanges among parties with electronic access to discovery materials in advance of, as well as during, the adjudication. At the time

²⁰Before DOE submitted its license application and NRC commenced the adjudication, the ASLBP appointed two other preliminary licensing boards to (1) rule on disputes over electronic availability of documents and (2) advise the Commission and issue case management orders on procedural matters expected to arise during the adjudication.

DOE submitted its license application, the LSN provided access to more than 3.6 million documents that the parties had designated as relevant to the proceeding and that might be entered into evidence during evidentiary hearings. The parties were to maintain and update their own document collections, according to NRC regulations and guidance; these party collections were made available and searchable for the other parties through an NRC website for the LSN that utilized hardware and software to facilitate search and retrieval of the parties' LSN documents. An LSN Administrator was responsible for helping to maintain the system and provide technical assistance to the parties.

When DOE submitted its motion to withdraw its license application, the parties were beginning to schedule depositions as part of an initial discovery phase of the adjudication. The licensing board responsible for discovery and other preliminary matters had determined it would divide discovery and subsequent hearings into multiple phases to coincide with NRC staff's preparation of the five-volume Safety Evaluation Report, which the staff planned to release serially, starting with Volumes 1 and 3. To help NRC maintain the 3-year statutory time frame, this licensing board ordered that the first phase of discovery would begin in October 2009, ahead of the staff's anticipated release of Volume 1 of the Safety Evaluation Report, and would end in November 2010, after the anticipated release of Volume 3. During this phase, the parties were permitted to carry out discovery activities on the 187 contentions that related to these two volumes, particularly Volume 3, which would provide the NRC staff's views on whether the proposed repository's design, performance, and operation complied with NRC's requirements for the repository's safety after permanent closure. Discovery activities for the remaining contentions would be scheduled around the expected release of additional volumes of the Safety Evaluation Report.²¹

²¹CAB Case Management Order #2, ASLB, In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001-HLW, ASLBP No. 09-892-HLW-CAB04, Sept. 30, 2009.

DOE and NRC Largely Dismantled Capabilities for the Yucca Mountain Licensing Process and Report Having No Formal Plans to Resume the Adjudication

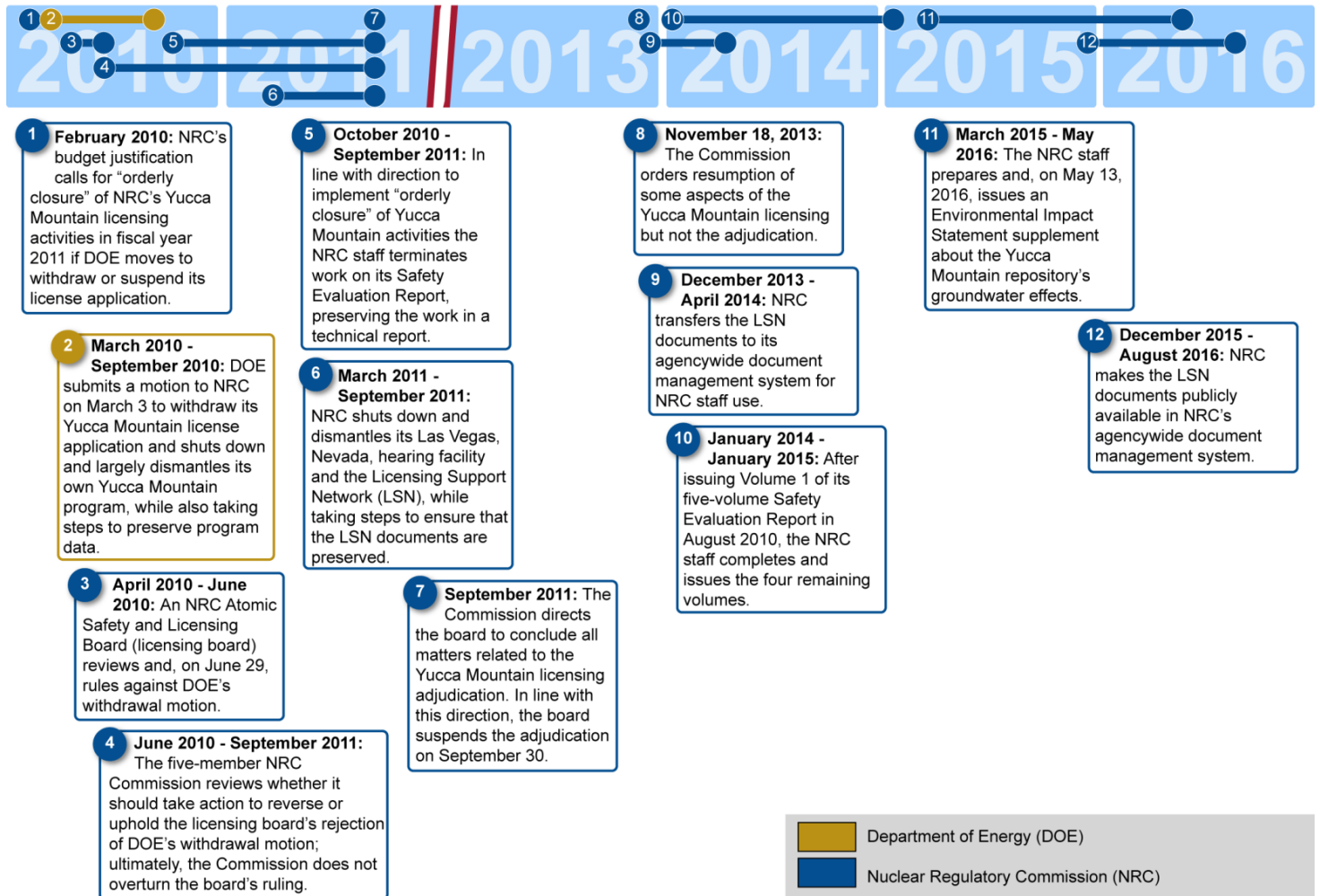
After DOE submitted its motion on March 3, 2010, to withdraw its license application for Yucca Mountain, DOE and NRC largely dismantled their capabilities to carry out the Yucca Mountain licensing process, and, as of late 2016 and early 2017, DOE and NRC told us they have no formal plans for resuming the licensing adjudication.²² DOE's and NRC's actions after the motion to withdraw the license application included eliminating organizations and funding, canceling the NRC staff's ongoing technical review of the application in October 2010, and taking other dismantlement steps, while also taking numerous steps to preserve associated documents and data, as directed by NRC. DOE and NRC carried out these steps while the licensing adjudication was still technically ongoing and even after an Atomic Safety and Licensing Board convened at the time had denied DOE's withdrawal motion in June 2010. By the time NRC formally suspended the adjudication in September 2011, DOE and NRC had mostly completed their dismantlement and data preservation steps, and the overall licensing process had already been effectively suspended. Although NRC later resumed some aspects of the licensing process from 2014 through 2016, after an appeals court ruled that NRC had violated the NWPA by suspending its licensing review,²³ NRC did not resume the licensing adjudication.²⁴ Figure 2 shows a timeline of selected actions and decisions related to the Yucca Mountain licensing proceedings from February 2010, slightly before DOE submitted its motion to withdraw its application, through 2016.

²²In March 2017, the President announced that the fiscal year 2018 budget request will include \$120 million to restart licensing activities for the Yucca Mountain repository and initiate an interim storage program. See Office of Management and Budget, *America First: A Budget Blueprint to Make America Great Again* (Washington, D.C.: March 2017).

²³In re Aiken County, 725 F.3d 255 (D.C. Cir. 2013).

²⁴Memorandum and Order, NRC, In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001-HLW, 78 NRC 219, Nov. 18, 2013.

Figure 2: Timeline of Selected Actions and Decisions Related to the Department of Energy’s Motion to Withdraw Its License Application for the Yucca Mountain Repository



Source: GAO analysis of DOE and NRC information. | GAO-17-340

As we found in April 2011, DOE took steps to quickly dismantle its capabilities to carry out its Yucca Mountain repository program, including the licensing process.²⁵ These dismantlement steps began around the time DOE submitted its March 2010 motion to withdraw its license application and followed DOE's announcements in the previous year that

²⁵GAO-11-229.

it planned to terminate its proposal for Yucca Mountain and study other disposal options. The steps were substantially completed by the end of fiscal year 2010. As we found in our April 2011 report, these steps generally included:

- Dissolving DOE's Office of Civilian Radioactive Waste Management—the office established by the NWPA to manage DOE's repository program—and transferring tasks to other DOE programs, such as the Office of Legacy Management, which assumed responsibility for archiving documents and data from the Yucca Mountain program, and the Office of Nuclear Energy, which is now responsible for DOE's efforts to investigate the disposal, storage, and transportation of spent nuclear fuel and high-level waste.
- Eliminating positions of all federal employees working on the Yucca Mountain program in the Office of Civilian Radioactive Waste Management, including about 180 federal staff working, in part, on defending DOE's license application. As we found in our April 2011 report, DOE's efforts to retain Yucca Mountain project staff were minimal. In that report, we found that the about 180 federal staff were 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 increased stress on the remaining staff to complete an orderly shutdown.
- Terminating project activities being carried out by contractors, including DOE's national laboratories, whose scientists and engineers were preparing to defend DOE's license application during the licensing adjudication. As we found in our April 2011 report, 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.
- Closing hundreds of DOE's other contracts and subcontracts, terminating leases for office space, and transferring dozens of truckloads of office equipment and computers to other DOE facilities and local schools.

Also, as we found in our April 2011 report, DOE undertook extensive efforts to preserve its documents, data, and software used for its licensing efforts and the Yucca Mountain program.²⁶ Similarly, in 2013, the U.S. Nuclear Waste Technical Review Board—an independent agency of the

²⁶[GAO-11-229](#).

federal government created by Congress—reported finding that the Yucca Mountain documents had been preserved and could be accessed and retrieved.²⁷ This included documents from a primary database, which was one of 17 high-priority Yucca Mountain-related databases and systems containing millions of electronic records, technical models, and data, and according to DOE Office of Legacy Management officials, about 60 million e-mails and attachments. According to the Office of Legacy Management officials, the 17 systems are being maintained on servers in the office’s West Virginia data facility, and backup copies have been made. Also at this facility, the officials said they are maintaining the servers that contain DOE’s LSN document collection and were previously used to make DOE’s collection available to the other parties through the LSN; as noted earlier, the parties could access the LSN through an NRC website enabling them to search for and retrieve each other’s LSN documents. In addition, the Legacy Management officials said they have archived approximately 14,000 cubic feet of paper documents from the Yucca Mountain program.

NRC’s steps to dismantle its capabilities to carry out the licensing process and to preserve associated documents and other data mainly occurred in fiscal year 2011, according to NRC documents and officials. The steps were largely in response to NRC’s budget justification for fiscal years 2011 and 2012,²⁸ which called for substantially reducing and then eliminating NRC’s resources for carrying out the licensing process. Specifically, the fiscal year 2011 budget justification proposed reductions in NRC’s funding and staffing allocations for its Yucca Mountain licensing activities by more than half from fiscal year 2010 levels. The reductions were to carry out an “orderly closure” of those activities, which consisted of the NRC staff’s technical review and the licensing adjudication.²⁹

²⁷U.S. Nuclear Waste Technical Review Board, *Review of U.S. Department of Energy Activities to Preserve Records Created by the Yucca Mountain Repository Project*, (Arlington, Va.: August 2013).

²⁸See Nuclear Regulatory Commission, *Congressional Budget Justification for FY 2011*, NUREG-1100, Vol. 26 (February 2010) and *FY 2012 Congressional Budget Justification*, NUREG-1100, Vol. 27 (February 2011).

²⁹NRC’s congressional budget justification for fiscal year 2011 called for a 65 percent reduction in High-Level Waste Repository program funding—from \$29 million in fiscal year 2010 to \$10 million in fiscal year 2011—and an approximately 68 percent reduction in staffing allocations—from 99 to 32 full-time equivalent staff—primarily for NRC’s licensing activities for Yucca Mountain. NRC proposed eliminating these funding and staffing allocations in its budget justification for fiscal year 2012.

According to NRC's 2011 budget justification, which NRC issued in February 2010 before DOE's withdrawal motion, the substantially reduced funding and staffing reflected the possibility that DOE might submit such a motion to NRC in fiscal year 2010 and that, upon the withdrawal or suspension of the licensing review, NRC would begin closing down its licensing activities. NRC's fiscal year 2012 budget justification, issued in February 2011, requested no funding or staffing resources for these activities, which, according to the 2012 budget justification, would terminate in fiscal year 2011.³⁰

NRC staff, the ASLBP, and others carried out the following dismantlement and data preservation steps, which were focused on the staff's technical review of DOE's license application, the ASLBP's Las Vegas Hearing Facility, and the LSN:

- **NRC staff's technical review.** Shortly after releasing Volume 1 of its five-volume Safety Evaluation Report in August 2010, the NRC staff began shutting down its activities related to the Yucca Mountain licensing, while preserving knowledge from the effort. In October 2010, NRC's Chief Financial Officer and the Executive Director of Operations instructed the staff to implement the Commission's direction in NRC's fiscal year 2011 budget justification, which, as noted earlier, called for orderly closure of NRC's Yucca Mountain licensing activities.³¹ Also in October 2010, the Chairman of the Commission directed the NRC staff to stop its work on the four unreleased volumes of the Safety Evaluation Report, including Volume 3, which the staff was preparing to release the following month, according to NRC staff and a June 2011 report from NRC's

³⁰According to a June 2011 report from the NRC Office of the Inspector General, the Commission intended to make \$4 million available in fiscal year 2012 for NRC's Yucca Mountain closure activities. However, the Office of Management and Budget allocated no money for this purpose, which is reflected in NRC's *FY 2012 Congressional Budget Justification*.

³¹This direction came from an October 4, 2010, guidance memorandum signed by the Chief Financial Officer and the Executive Director for Operations. The memorandum provided guidance to NRC office directors and regional administrators for executing NRC's budget under the continuing resolution in effect at the time. According to the memorandum, NRC's fiscal year 2011 budget justification sustained the agency's programs at approximately their fiscal year 2010 levels, with the exception of the orderly closure of NRC's Yucca Mountain licensing activities.

Office of the Inspector General.³² In response to this direction in October 2010, the NRC staff and contractors working on the Safety Evaluation Report halted this work and, instead, prepared a series of technical reports to preserve the staff's and contractors' knowledge. However, unlike the Safety Evaluation Report, the technical reports were not a required step in the Yucca Mountain licensing process and, according to NRC staff, did not contain the staff's regulatory conclusions about DOE's license application. Furthermore, as noted earlier, the schedule for the initial discovery phase of the adjudication was timed to coincide with the serial release of Volumes 1 and 3 of the Safety Evaluation Report. With work halted on Volume 3 and the other unreleased volumes, among other reasons identified by the licensing board and the parties, meaningful progress to complete the discovery phase of the adjudication was effectively stopped, and no discovery depositions were conducted.³³

- **Las Vegas Hearing Facility.** In March 2011, the ASLBP began dismantling its customized hearing facility in Las Vegas in response to the fiscal year 2012 budget justification. According to an ASLBP official, NRC began leasing the facility in 2005 at an annual cost of about \$440,000, and it spent approximately \$2.4 million to build out, equip, and provide facility security specifically for the Yucca Mountain adjudication. However, because NRC's budget justification for 2012 did not allocate any funding or staffing resources to the Yucca Mountain licensing effort, the ASLBP's Chief Administrative Judge advised the Commission in a February 17, 2011, memorandum that the ASLBP would begin shutting down the Las Vegas Hearing Facility in March 2011, unless directed otherwise by the Commission.

³²Nuclear Regulatory Commission, Office of the Inspector General, "NRC Chairman's Unilateral Decision to Terminate NRC's Review of DOE Yucca Mountain Repository License Application (OIG Case No. 11-05)" (Washington, D.C.: June 6, 2011).

³³According to NRC documents issued during the licensing adjudication, the licensing board appointed at the time was, at various points, also awaiting guidance from a federal appeals court and the Commission about whether DOE could legally withdraw its license application for Yucca Mountain. While the licensing board was awaiting this guidance, DOE requested in a January 21, 2011, motion that the board temporarily suspend the adjudication, citing, among other things, budgetary uncertainties and inaction by the parties to depose witnesses during the initial discovery phase. The board denied DOE's request but in a May 20, 2011, memorandum and order granted DOE relief from the state of Nevada's notices to depose multiple DOE witnesses, citing the need to avoid unnecessary expenses while the future course of the proceeding remained uncertain. Although no depositions were conducted, adjudicatory activities continued. For example, according to NRC documents, the licensing board ruled on various motions from the parties and issued a decision resolving a few of the approximately 300 contentions.

Receiving no such direction, the ASLBP carried out dismantlement activities from March 2011 through September 2011, according to an ASLBP official. These activities mainly consisted of removing furniture and dismantling information technology equipment, such as video, audio, and teleconferencing equipment and computer terminals. According to the ASLBP official, most of the surplus furniture and equipment was donated to governmental or non-profit organizations in the Las Vegas area, although a small amount was used to replace aging furniture at NRC's hearing facility in Rockville, Maryland, or to provide back-up equipment.

- **Licensing Support Network.** In the February 17, 2011, memorandum, the Chief Administrative Judge advised the Commission of the ASLBP's plans to begin shutting down the LSN in May 2011, unless directed otherwise. As with its dismantlement of the Las Vegas Hearing Facility, ASLBP officials told us they received no direction from the Commission to keep the LSN intact; therefore, they carried out LSN shutdown activities from May through September 2011. According to these officials, the activities included taking the LSN offline in August 2011 and then canceling contracts for system software and hardware and relocating NRC servers used to operate the LSN from an offsite contractor-hosted facility. At the same time, the licensing board appointed to manage discovery during the adjudication, as well as DOE and the other parties, had been taking measures throughout fiscal years 2010 and 2011 to preserve the LSN documents and data. These measures were generally in response to the licensing board's December 2009 directive instructing the parties not to take any actions that would prevent or hinder their ability to archive their LSN documents in a readily accessible format, such as PDF.³⁴ Facing the likelihood that no funding or staffing resources would be available in fiscal year 2012 for the LSN or its administrator, in April 2011, the licensing board further instructed the parties to submit optical media, such as CD-ROM disks, containing PDF copies of their LSN documents to NRC's Office of the Secretary for safekeeping and later inclusion in NRC's agencywide document management system.³⁵ The licensing board also instructed the parties

³⁴Order (Concerning LSNA Memorandum), NRC, In the Matter of U.S. Department of Energy (High Level Waste Repository), Docket No. 63-001-HLW, ASLBP No. 09-892-HLW-CAB04, Dec. 22, 2009.

³⁵Order (Concerning LSNA Memorandum and Parties' LSN Document Collections), ASLB, In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04, Apr. 11, 2011.

to maintain backup copies of their LSN documents. In July and August 2011, DOE and other parties submitted their LSN documents to the Office of the Secretary and, according to representatives we interviewed for several of the nonfederal parties, also maintained their own backup copies.

Moreover, DOE and NRC carried out these dismantlement steps while the licensing adjudication was still ongoing and even after a licensing board formally ruled against DOE's motion to withdraw its license application in June 2010—a ruling that, because of an evenly divided vote, the Commission did not overturn. In its June 2010 ruling, the licensing board determined that DOE's attempt to withdraw from the licensing proceedings violated Congress's intent in the NWPA, which required that DOE file a license application for Yucca Mountain for NRC to consider and issue a final merits-based decision approving or disapproving construction authorization.³⁶ The day after this board issued its ruling rejecting DOE's withdrawal motion, the Commission initiated its own review of the ruling. The Commission took over a year to complete and announce the result of its review. During this time, the licensing adjudication was ongoing but, as noted earlier, meaningful progress to complete the discovery phase was effectively stopped, and no depositions were conducted. In September 2011, the Commission announced that it was evenly divided on whether it should take action to reverse or uphold the licensing board's decision to reject DOE's withdrawal motion—which meant that the board's ruling stood.³⁷ At the same time, the Commission directed the board to conclude all pending matters related to the Yucca Mountain licensing adjudication by the end of fiscal year 2011, stating in its direction that this decision was consistent with budgetary limitations. In response, the licensing board announced on

³⁶Memorandum and Order (Granting Intervention to Petitioners and Denying Withdrawal Motion), ASLB, In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001, ASLBP No. 09-892-HLW-CAB04, June 29, 2010. Also in this decision, the licensing board admitted 5 nonfederal entities as parties to the licensing adjudication for Yucca Mountain—in addition to the 12 nonfederal parties admitted up to this point—and accepted these parties' contentions into the proceeding. As noted earlier, these 5 parties included Aiken County, South Carolina; Prairie Island Indian Community; the National Association of Regulatory Utility Commissioners; the state of South Carolina; and the state of Washington—for a total of 17 nonfederal parties. According to representatives for some of these 5 parties, the parties wanted to participate in the licensing adjudication in order to ensure the Yucca Mountain licensing process would continue and to oppose DOE's efforts to withdraw its license application.

³⁷Memorandum and Order, NRC, In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001, Sept. 9, 2011.

September 30, 2011, that it was suspending the licensing adjudication, consistent with the Commission's direction and in light of the fact that no funding or staffing resources had been requested for fiscal year 2012.³⁸

Although the adjudication was formally suspended in September 2011, a federal appeals court later required NRC to continue with the licensing process. In August 2013, the U.S. Court of Appeals for the District of Columbia Circuit ordered NRC to resume the Yucca Mountain licensing process.³⁹ The ruling arose from multiple lawsuits challenging DOE's withdrawal from the licensing process and, later, NRC's attempts to halt the process. A few of the nonfederal parties that joined later in the licensing adjudication were among the entities that filed these lawsuits. Although the court did not rule on whether DOE could legally withdraw from the licensing proceedings, in its August 2013 ruling, the court found that NRC violated the NWPA by halting its review and that it was required to continue with the proceedings. Furthermore, the court rejected NRC's arguments that it did not have sufficient funding to carry out the proceedings, noting that NRC had millions of dollars in appropriations that could be used for this purpose.

In response to this ruling and after receiving views from parties to the adjudication, the Commission instructed the agency staff and others in a November 2013 directive, to use the agency's \$13.5 million in unobligated and obligated, unexpended appropriations from the Nuclear Waste Fund to continue with certain aspects of the licensing.⁴⁰ From January 2014 through August 2016, NRC carried out the following additional actions to help further the Yucca Mountain licensing process:

- **Completion of the Safety Evaluation Report.** In its November 2013 directive, the Commission instructed the NRC staff to complete its Safety Evaluation Report, which the Commission noted in its directive was a logical next step for carrying out the licensing process and would be needed to complete the discovery phase of the licensing adjudication. In response, in January 2014, NRC staff and contractors

³⁸Memorandum and Order (Suspending Adjudicatory Proceeding), ASLB, In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001-HLW, ASLBP No. 09-892-HLW-CAB04, Sept. 30, 2011.

³⁹In re Aiken County, 725 F.3d 255 (D.C. Cir. 2013).

⁴⁰Memorandum and Order, NRC, In the Matter of U.S. Department of Energy (High-Level Waste Repository), Docket No. 63-001-HLW, 78 NRC 219, Nov. 18, 2013.

resumed drafting the four remaining volumes of the five-volume report. These volumes were completed and issued in late 2014 and early 2015.⁴¹

- **EIS supplement on groundwater impacts.** Also in its November 2013 directive, the Commission requested that DOE prepare an EIS supplement on the repository's groundwater impacts, essentially renewing the NRC staff's earlier request to DOE to prepare this supplement. After initially agreeing to the earlier request, DOE informed NRC in a July 2009 letter that it had decided not to prepare the supplement. While DOE's letter did not include a reason, DOE provided analyses and supporting documentation that it said would supply the needed information on groundwater impacts. Later, in a February 2014 letter responding to NRC's renewed request, DOE once again stated that it would not prepare the supplement but would provide the aforementioned analyses, which DOE officials told us they then updated and provided to NRC. As a result, in February 2015, the Commission approved a plan by the NRC staff to complete the groundwater supplement and thereby complete the EIS for the repository; the Commission had noted in its November 2013 directive that a complete EIS would be needed for the adjudication's discovery phase and for evidentiary hearings. After starting work on the supplement in March 2015, the NRC staff issued the draft supplement in August 2015 for public comment and issued the final supplement in May 2016.⁴²
- **Preservation of the Licensing Support Network documents.** As a final action to continue the licensing process in response to the court decision, in its November 2013 directive, the Commission instructed that the LSN documents be transferred from the CD-ROM disks and other optical media to NRC's agencywide document management system, in accordance with NRC's records requirements and to preserve the LSN documents and make them available for NRC staff

⁴¹Volume 3 was released on Oct. 16, 2014; Volume 4, on Dec. 18, 2014; and Volumes 2 and 5, on Jan. 29, 2015.

⁴²Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste; Department of Energy; Yucca Mountain, Nye County, Nevada, Supplement to Environmental Impact Statement; Issuance, 81 Fed. Reg. 29,923 (May 13, 2016). Department of Energy; Yucca Mountain, Nye County, Nevada, Draft Supplement to Environmental Impact Statement; Availability, 80 Fed. Reg. 50,875 (Aug. 21, 2015).

working on the Safety Evaluation Report.⁴³ Later, the Commission instructed that the entire LSN document collection could be made publicly available and searchable in that system if substantial progress was made on NRC's other efforts to further the licensing and if sufficient funding was available. In response, from December 2013 through April 2014, agency information technology staff transferred the LSN documents into a nonpublic portion of NRC's agencywide document management system, according to NRC monthly status reports on its activities related to Yucca Mountain licensing. In December 2015, with Commission approval, efforts to make the LSN documents publicly available and searchable began. In August 2016, the LSN collection was made public in NRC's agencywide system.⁴⁴

Although NRC continued with some aspects of the Yucca Mountain licensing process in response to the 2013 court order, as of late 2016 and early 2017, DOE and NRC told us they have no formal plans to resume the licensing adjudication. In the Commission's November 2013 directive, it announced that the adjudication would remain suspended, even as NRC continued with other aspects of the licensing process. According to this directive, the Commission had requested and received input from DOE, NRC staff, and the other parties about how best to continue with the process; this input included some parties' requests that the Commission take action to resume the adjudication's discovery phase. The Commission concluded in its November 2013 directive that available funding was insufficient to complete the licensing adjudication and that any attempt to resume the discovery phase would likely result in resuspension of the adjudication without meaningful progress. Subsequently, in July 2016, NRC officials in the Office of Commission Appellate Adjudication, Office of the General Counsel, and other offices told us that NRC has no formalized plans for resuming the licensing adjudication, which NRC reaffirmed in December 2016.

⁴³The Commission also instructed that LSN documents referenced in the staff's Safety Evaluation Report be made publicly available in NRC's agencywide document management system.

⁴⁴In November 2016, officials from the ASLBP and NRC's Office of the Secretary told us that most of the LSN documents had been successfully transferred to this system, and they were working to resolve issues encountered with around 160 out of the millions of LSN documents and expected to finish resolving the issues around March 2017, according to the agency. According to the officials, issues included such things as overly large files, document corruption, and missing or invalid document numbers. To resolve these issues, the officials said that NRC requested replacement copies for some of the documents or incorporated unnumbered documents into the agencywide document management system.

Officials from DOE's Offices of Nuclear Energy and General Counsel told us in July 2016 and November 2016 that they have no plans to resume the adjudication portion of the Yucca Mountain licensing process while the adjudication remains suspended, and that they could not begin taking any such steps until the process was reinitiated by NRC. This is consistent with what DOE officials have told us in the past. For example, DOE disagreed with a recommendation in our April 2011 report that it develop a preliminary plan to restart the Yucca Mountain project, in case DOE is required to do so. In August 2015, DOE reiterated its disagreement and told us it would not be implementing this recommendation and, as of February 2017, had not done so. However as noted earlier, the President announced in a March 2017 budget blueprint that the fiscal year 2018 budget request will include \$120 million to restart licensing activities for the Yucca Mountain repository and initiate an interim storage program but did not provide further detail about the request.⁴⁵

Resuming and Completing the Licensing Process Would Likely Require Four Key Steps, Which May Be Influenced by Several Factors

From our review of the NWPA; NRC's regulations; other documents; and from our interviews with NRC and DOE officials, contractors, nonfederal party representatives, and others, we identified four key steps that would likely be required for resuming and completing the licensing process for Yucca Mountain: (1) receiving direction and obtaining funding, (2) rebuilding organizational capabilities and updating key documents used for the licensing, (3) reconvening the parties and completing the remaining phases of the licensing adjudication, and (4) completing the remaining steps of the licensing process, including NRC's decision on construction authorization. Also, a number of factors could influence the steps' success, including the time and resources needed to carry out the steps.

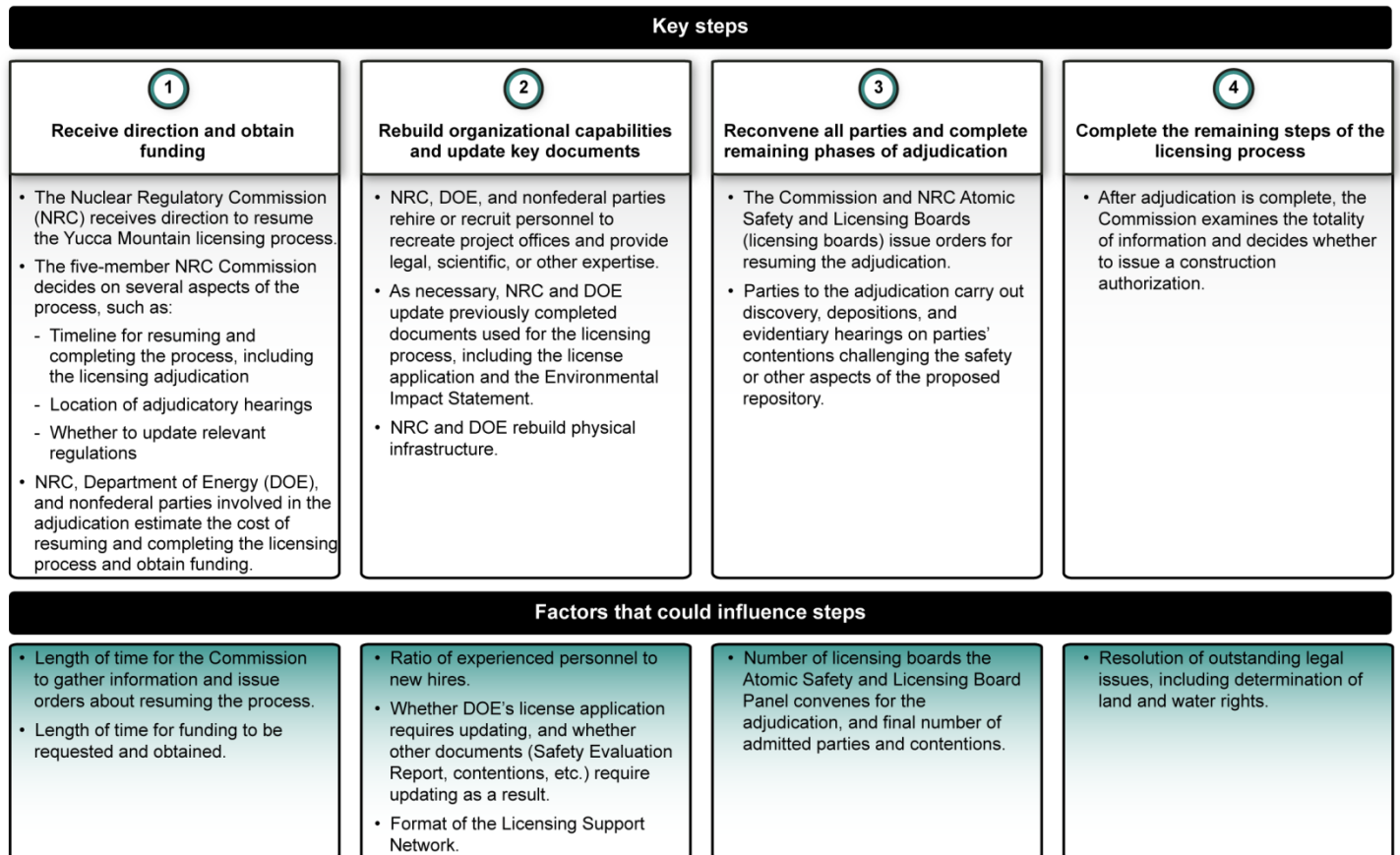
⁴⁵Office of Management and Budget, *America First: A Budget Blueprint*.

DOE, NRC Staff,
Nonfederal Parties, and
Others Would Need to
Receive Direction and
Obtain Funding to
Resume and Complete the
Licensing Process

We identified receiving direction and obtaining funding as the first key step for resuming and completing the Yucca Mountain licensing process (see fig. 3); this step includes three major actions: (1) The Commission directing the parties to resume the licensing process, likely in response to direction from Congress or the administration to resume the process, (2) the Commission making decisions on several aspects of the adjudication and providing direction, and (3) NRC, DOE, and nonfederal parties to the adjudication estimating their costs to resume and complete the licensing process and obtaining funding.⁴⁶

⁴⁶The NWPA directs DOE to provide grants to the state of Nevada, affected units of local government, and affected Indian tribes to, among other things, set up oversight programs for studying the potential impacts of the repository.

Figure 3: Likely Key Steps for Resuming and Completing the Yucca Mountain Licensing Process



Source: GAO analysis of Yucca Mountain licensing documents and data. | GAO-17-340

As a first major action in resuming and completing the Yucca Mountain licensing process, the parties would need to receive direction from the Commission to resume the process. NRC could decide to resume the licensing process of its own accord and request funding to resume the licensing adjudication. However, according to a senior NRC official, the Commission is likely to wait for direction from an external authority—either Congress or the administration—before resuming the licensing process. According to the Commission, NRC has not requested additional funding to resume the process after fiscal year 2011 because the

Commission did not vote to do so.⁴⁷ Other NRC officials told us the Commission may be waiting for an external trigger to resume the licensing adjudication, in part because its members may not see the value in resuming a lengthy, complicated process that cannot be completed without a commitment to sustained funding. Additionally, according to these officials, the Commission may want to be sure that DOE would defend its license application if the licensing process resumes. DOE officials told us they would defend the license application if instructed to do so by the administration or Congress.

As a second major action, the Commission—and the ASLBP based on Commission directions—would need to make decisions about the adjudicatory process and provide guidance to all of the parties involved. These decisions and guidance would set the parameters for resuming and completing the licensing process. Key areas that parties said they need guidance about include:

- **A timeline for resuming and completing the process.** Of the 15 nonfederal parties we interviewed or that gave us written remarks, representatives of some of the nonfederal parties said that it would be important to re-establish a timeline or schedule for resuming the process, including time for parties to rebuild organizational capacity and review material, before the adjudication resumes. Nonfederal party representatives also said it is important to have information on how quickly the process is expected to proceed once it is resumed. The 3-year time frame required by the NWPA has passed, but in the absence of a change to the NWPA, the Commission could decide to try to meet the intent of that provision by planning to complete the licensing process within 3 years, according to ASLBP officials. However, one official raised concerns that 3 years may be an unrealistic goal for completing the licensing process because of the time needed for parties to be ready to resume and for one or more licensing boards to hear and rule on all of the admitted contentions during the adjudication, as discussed below.

⁴⁷As noted earlier, the Commission intended to make \$4 million available in fiscal year 2012 for NRC's Yucca Mountain closure activities. However, according to a June 2011 report from the NRC Office of the Inspector General, the Office of Management and Budget allocated no money for this purpose, which was reflected in NRC's *FY 2012 Congressional Budget Justification*. Also, as noted earlier, in March 2017, the President announced that the fiscal year 2018 budget request will include \$120 million to restart licensing activities for the Yucca Mountain repository and initiate an interim storage program.

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- **The number of licensing boards that would hear contentions.** The number of licensing boards that would hear contentions is one of the decisions that could determine how quickly the process can be completed. Before the adjudication was suspended in September 2011, the ASLBP had not decided on the number of boards that would hear contentions. ASLBP officials told us that they estimate needing approximately 1.5 hearing days per contention, as well as time to draft decisions for each contention. With some 300 contentions already admitted, this could require an estimated 450 hearing days in total, potentially spread across more than one licensing board. ASLBP officials said that as many as four boards could be needed to get through that many contentions in the officials' anticipated time frame, but they said the decision on the number of boards ASLBP authorizes would need to reflect any Commission direction and possibly input from the parties. Two parties involved with a large number of the admitted contentions noted that the use of multiple licensing boards could require them to hire more legal and technical help to prepare for simultaneous hearings before multiple boards.
 - **Updating the status of the nonfederal parties and whether new parties would be admitted.** NRC officials said that an important early decision in the adjudication would be to determine which of the involved parties intend to continue their participation. Some parties may not wish to continue, especially those who gained admission later in adjudication in order to contest DOE's efforts to withdraw from the proceeding. Additionally, if DOE amends its license application, the Commission may wish to allow time for new parties to file petitions to participate in the adjudication, and for existing parties to file new or amended contentions, according to ASLBP officials. The Commission may decide to restrict new contentions to only those parts of the application that have been updated, or it may allow any new contentions to be filed.
 - **Location of hearings.** As mentioned previously, before the Yucca Mountain licensing process and adjudication were suspended, the ASLBP dismantled its dedicated hearing facility in Las Vegas. NRC officials noted that the Commission's facilities in Rockville, Maryland, might be available for some of the Yucca Mountain proceedings, in conjunction with Web-based meeting and video conferencing capabilities. Alternatively, the Commission could decide to obtain a hearing space in or near Las Vegas. According to some of the nonfederal parties we interviewed, having a hearing site located close to Yucca Mountain would help increase their ability to participate in the adjudication and decrease their costs.

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- **Format of the Licensing Support Network.** Previously, decisions about the LSN were made based on recommendations from the LSN Administrator and the LSN Advisory Review Panel, according to NRC documents.⁴⁸ Since document management and search technology have changed substantially after NRC updated its regulations in 1998 to adopt the LSN, the Commission would need to decide whether to request updated guidelines and options for restarting the LSN from the Advisory Review Panel, according to NRC officials. Then the Commission would need to decide whether to re-start the LSN as it was before the suspension or, based on changes to the relevant NRC regulations or Commission directives, direct that the LSN Administrator and the ASLBP, which oversaw the LSN before the suspension, design and implement a different type of system.
 - **Updates or revisions to regulations.** The Commission may need to update regulations that are out of date and may no longer be valid, according to NRC officials. For example, NRC's 3-year time frame in its regulations for completing the licensing process may no longer be valid and may need to be revised or superseded by a Commission directive.

The Commission has previously sought input on decisions related to the Yucca Mountain licensing process. For example, as mentioned above, the Commission chartered the LSN Advisory Review Panel to provide recommendations about how best to implement the original LSN. Additionally, after the 2013 ruling by a federal appeals court that ordered NRC to continue work on the licensing process, the Commission sought the views of the parties to the adjudication about how to proceed with licensing activities, as noted earlier. According to a senior NRC official, based on the Commission's past actions, it is likely that the Commission would seek input from the ASLBP, NRC staff, DOE, and the nonfederal parties to obtain their views on how to proceed with the licensing process. The amount of time the Commission takes to solicit opinions, consider them, and issue direction about the above-discussed areas would affect how long it takes to resume the process. Representatives of a few of the

⁴⁸ Convened in 1989, the currently named LSN Advisory Review Panel is made up of representatives of the state of Nevada, DOE, NRC, the affected units of local government, affected Indian tribes, and industry groups. Selected federal agencies with substantial experience in electronic information management systems may also be included on the panel. The panel advises the Commission and the LSN Administrator on procedures and standards for managing the document collections necessary for the Yucca Mountain licensing adjudication. According to its charter, the panel is to remain active until the Yucca Mountain proceeding terminates.

nonfederal parties told us they wanted to provide input before resuming the process.

As a third major action of the first key step we identified for resuming and completing the Yucca Mountain licensing process, NRC, DOE, and the nonfederal parties that previously received federal funding to participate in Yucca Mountain oversight and the adjudication would need to estimate the funding they need to resume and complete the licensing process. Representatives from DOE and NRC, as well as the nonfederal parties that previously received funding, told us that they would need funding to resume and complete the licensing process. Representatives for two of the parties also said that they would need direction from the Commission and ASLBP on issues discussed above in order to prepare meaningful estimates of their costs to complete the licensing process.

In 2014, NRC prepared an estimate on how much funding and time it would need to resume and complete the proceeding, in response to a request from the House Appropriations Committee.⁴⁹ The estimate—\$330 million in NRC’s costs and up to 5 years to resume and complete the Yucca Mountain licensing adjudication—was based on several assumptions about what resuming the adjudication might entail, including reconstituting a hearing facility, reconstituting the LSN, admitting as many as 100 new contentions, and running multiple licensing boards, among other assumptions. NRC’s estimate of \$330 million, as discussed by NRC officials we interviewed, also included an estimated \$60 million to \$70 million for certain ASLBP costs to resume and complete the adjudication. This ASLBP estimate included, for 600 hearing days, the costs for current and potential future full-time employees to support the adjudication, travel and lodging, transcription services, web streaming and video conferencing, and security, but did not include costs to acquire a hearing facility. An NRC official told us that the \$330 million estimate from 2014 has not been updated and costs could be higher today. Based on our review, the NRC and ASLBP estimates include costs for activities that would be needed if the licensing process resumes and take into account how the Commission has acted in the past; however, it is difficult to determine whether the assumptions or estimates are accurate because, as NRC officials told us, the Yucca Mountain licensing adjudication is the largest in NRC’s history. The total NRC estimate, at \$330 million in NRC’s

⁴⁹Letter from NRC Chairman Alison McFarlane to Chairman of the House Committee on Appropriations, Harold Rogers, August 29, 2014.

costs and up to 5 years to complete the adjudication, is generally within the bounds of previous appropriations for NRC's Yucca Mountain work in fiscal years 2005 through 2010, when it received between about \$29 million and \$70 million annually, although this previous funding fluctuated and may not be reflective of future needs.

DOE has not estimated how much resuming the Yucca Mountain licensing process might cost. DOE officials said that they need more information from NRC or Congress about the scope and timeline for resuming the adjudication process to make a credible estimate of the total cost of their efforts. From fiscal years 2006 through 2009, DOE requested between about \$500 million and about \$650 million annually to carry out work on developing the license application and other Yucca Mountain program activities.⁵⁰ In fiscal years 2009 and 2010, Congress appropriated \$288 million and \$197 million, respectively, according to an Office of Civilian Radioactive Waste Management analysis from 2010, and DOE officials said that by 2009, the bulk of their work was focused on obtaining construction authorization, and funding for other aspects of the Yucca Mountain project, such as for transporting waste to the site, had been reduced. In October 2016, DOE reported having about \$31 million in obligated and unobligated appropriations from the Nuclear Waste Fund and the Defense Nuclear Waste Disposal account.

Additionally, under the NWPA, DOE has been responsible for issuing the funds to designated state, local, and tribal governments located near the Yucca Mountain site, including the state of Nevada, 10 county governments, and the Timbisha Shoshone Tribe.⁵¹ Under the NWPA, DOE provided funding to these 12 governments to, among other things, set up "oversight" programs for studying the potential impacts of the

⁵⁰Other program activities included research and development into areas such as transportation security and developing a safety culture that are not a direct part of the license application but are necessary for operating the repository. According to DOE, a number of activities would be necessary prior to constructing a repository at Yucca Mountain and prior to submitting an application to receive and possess spent nuclear fuel and high-level radioactive waste at the repository.

⁵¹The 10 county governments that received annual funding under the NWPA are known as "affected units of local government." They include the host county for the Yucca Mountain repository, Nye County, Nevada; 8 other Nevada counties, which are Churchill, Clark, Esmeralda, Eureka, Lander, Lincoln, Mineral, and White Pine Counties; and Inyo County, California. In addition, the state of Nevada received federal funding under the NWPA, as did the Timbisha Shoshone Tribe, which achieved a separate status as an affected Indian tribe.

repository and, more recently, to participate in the adjudicatory process. These 12 governments were among the 17 nonfederal parties admitted into the Yucca Mountain licensing adjudication. Representatives of nearly all of the 12 state, county, and tribal governments we interviewed stated that they would be dependent on federal funding to continue participating in the licensing process. In fiscal year 2010, these 12 governments received a total of approximately \$12 million dollars.⁵² Representatives for one of the 12 governments that was also among nonfederal parties we interviewed told us they had developed an estimate for the amount they would need to resume the adjudication.

The decisions that the Commission and the ASLBP make for resuming the adjudication process would influence how much funding the parties need. For example, a shorter schedule for resuming and completing the adjudication could require more funding for parties to hire additional legal and technical staff within prescribed time frames. Similarly, more licensing boards dealing with contentions likely would require parties to have additional technical and legal staff and witnesses ready simultaneously, which could cost more. Conversely, a longer timeline or fewer licensing boards could cost parties less but could also take more time to complete the process.

Parties Would Need to Rebuild Organizational Capabilities and Update Previous Work

Our analysis of documents and interviews indicated that the second key step in resuming and completing the Yucca Mountain licensing process would be to rebuild organizational capabilities that either were dismantled or have atrophied since the suspension of the licensing process, and to update any parts of the license application and other documentation that may require it. This would involve three major actions: (1) NRC, DOE, and nonfederal parties recruiting personnel to recreate project offices; (2) as necessary, NRC, DOE, and nonfederal parties updating previously completed documentation, including the license application; and (3) NRC and DOE rebuilding physical infrastructure.

As a first major action in rebuilding organizational capabilities, DOE and NRC officials and nonfederal party representatives from several of the 12

⁵²From funds appropriated to DOE during the fiscal year 2010 annual appropriations process, the state of Nevada received approximately \$2.5 million; Nye County, Nevada, where Yucca Mountain is located, received approximately \$5 million; and the remaining approximately \$4.5 million was divided amongst the other parties, about \$250,000 of which was designated for the Timbisha Shoshone Tribe.

governments and tribes that received federal funding said that they would need to recruit personnel to recreate their project offices. This could include bringing back staff that are available and willing to return to Yucca Mountain work or hiring new staff. The extent to which personnel would need to be rehired or replaced varies by organization and depends, in part, on the scope and schedule of activities.

- **NRC Staff.** According to NRC staff, NRC's Division of High Level Waste Repository Safety—later called the Yucca Mountain Directorate—had about 60 people working on the application review at its peak in 2009; another 74 people worked at the Center for Nuclear Waste Regulatory Analyses, which supported NRC's Yucca Mountain work. According to NRC staff, as work was completed, the NRC staff numbers declined until the final few people at NRC headquarters were reassigned, and NRC disbanded the Yucca Mountain Directorate in 2016. Similarly, the Center for Nuclear Waste Regulatory Analyses' 33 remaining staff began working on other projects after the Safety Evaluation Report was completed in 2015 and the EIS supplement on groundwater impacts was completed in 2016, according to that center's director and NRC staff. Since NRC has now issued these documents, it may not need as many people in the project office if the process resumes, though according to NRC officials, NRC would likely need a significant number of personnel to support the adjudicatory process, including technical staff and attorneys. NRC would also need to revise any documents, such as the Safety Evaluation Report, that may require updating.
- **ASLBP.** When the ASLBP staff were about to proceed with the discovery phase of the adjudication in 2010, the ASLBP had 19 full-time judges as well as a roster of part-time judges, 7 law clerks, and about 15 information technology and administrative personnel, ASLBP officials told us. Presently, the ASLBP has 11 full-time judges, 5 law clerks, and 11 information technology and administrative personnel. According to ASLBP officials, ASLBP may need to recruit additional judges, clerks, and support staff—especially information technology personnel—if it decides to use multiple licensing boards. One ASLBP official told us that recruiting new judges is a lengthy process and that it can take a year or longer to find people with the appropriate legal or technical expertise, who must then be interviewed and approved by the Commission. Furthermore, according to ASLBP officials, they would need to retain an LSN Administrator and a manager of the Las Vegas hearing facility, if these capabilities were reestablished.
- **DOE.** As we noted earlier, DOE's Office of Civilian Radioactive Waste Management employed about 180 federal staff working, in part, to

defend DOE's application at the time it was shut down and, according to former Office of Civilian Radioactive Waste Management officials we interviewed, also utilized thousands of contractor personnel. The former officials said that to resume the licensing, a new office could probably be smaller—anywhere from 15 to 60 federal employees and drawing on about 150 contractor staff—since so much work has already been completed. Contractors from DOE's former "lead laboratory" for its Yucca Mountain research, Sandia National Laboratories, said that of the few hundred people who originally worked on Yucca Mountain, roughly a third had retired and the other two-thirds had moved to other work at the lab. In order for the remaining two-thirds to be re-tasked to support Yucca Mountain, however, these officials told us that laboratory management would need to approve moving people off of their current work and back to supporting Yucca Mountain.

Furthermore, current and former DOE officials and contractors we interviewed generally agreed that DOE would need to reestablish the Office of Civilian Radioactive Waste Management in some form, but they had differing views on what the organization might look like. A few of the officials said that the organization could initially be fairly lean if it focused mainly on completing the licensing process. However, some of the officials and contractors said that if additional scientific or technical work is needed for the licensing—or if DOE also resumes its earlier work on other aspects of the Yucca Mountain project, such as development of transportation corridors for waste going to Yucca Mountain or development of appropriate waste containers—a larger organization could be needed to reestablish a quality assurance program for helping ensure the quality of scientific and technical work, among other aspects.⁵³

DOE officials told us they did not estimate how many people they might need to bring back or recruit to complete the licensing process

⁵³As an applicant, DOE is required by NRC regulations to establish and implement a quality assurance program. DOE's quality assurance program for Yucca Mountain establishes requirements that scientific, design, engineering, and other work, such as procurement and record keeping, is to be performed under controlled conditions that ensure quality and enable the work to be verified by others. Other programs DOE is required to implement include a performance confirmation program, a research and development program to resolve safety questions, and a personnel training program. All of these programs were run through the Office of Civilian Radioactive Waste Management before 2010. When the Office of Civilian Radioactive Waste Management was dismantled, all of the quality assurance and related programs were shut down. These would need to be resumed, and personnel who oversee them would need to be hired.

because personnel needs would vary depending on whether DOE is directed to focus solely on the license application or given broader scope to continue work on other areas of the Yucca Mountain program. DOE officials told us that DOE would have its external legal teams under contract until mid-2017 but could not extend DOE's contract beyond that date and would need to acquire specialized legal services under a new contract. Previously, in an April 2007 letter, the Secretary of Energy informed congressional leadership that although DOE had retained one outside law firm for the Yucca Mountain work, given the scope and magnitude of the licensing, DOE needed specialized legal services, which it planned to acquire through an "informal" rather than fully competitive process.⁵⁴ According to DOE's Office of General Counsel, in selecting the law firm currently under contract, DOE considered the firm's recent experience before NRC in contested licensing proceedings and its workload capabilities, among other factors.

- **Nonfederal parties.** Representatives for most of the nonfederal parties told us they would also need to reacquire at least some of their legal and technical staff in order to resume the adjudication. Many of the 12 nonfederal parties that previously received federal funding under the NWPA had project offices of varying sizes that were shut down or reduced in size after their federal funding stopped in 2010. Similarly, representatives of several nonfederal parties said their parties had to eliminate their contracts for legal, scientific, or technical expertise. In order to participate in the remainder of the process, these parties would need to rehire or replace staff and experts, according to representatives for the nonfederal parties.

The extent to which the organizations would need to rehire or replace personnel would depend on the scope and schedule of the adjudication as well as each organization's role in the proceeding. As noted above, DOE, for example, may need more legal and technical personnel in place to serve as witnesses and to help prepare for and appear at hearings, because they would be involved in defending DOE's application against all of the approximately 300 contentions that have been admitted. Other parties may only be involved in a few contentions and would likely need fewer personnel to take part in the adjudication. Similarly, if multiple licensing boards are hearing contentions, DOE officials and

⁵⁴Apr. 3, 2007, letter from Secretary of Energy, Samuel Bodman, to the Honorable Nancy Pelosi, Speaker of the U.S. House of Representatives, and the Honorable Richard B. Cheney, President of the U.S. Senate.

representatives for one of the nonfederal parties told us they would need multiple legal teams and technical experts for those panels.

Furthermore, according to NRC officials, contractors, and representatives of a few of the nonfederal parties we interviewed or that provided us written responses, bringing on new staff or outside experts could lengthen the time needed to prepare for resuming the adjudication. For example, NRC's contractors at the Center for Nuclear Waste Regulatory Analyses said they have reduced their budget and staffing levels in recent years as Yucca Mountain-related work has waned. While these contractors said they have maintained a core staff in this center's areas of expertise, if the licensing were to resume, they would likely want to bring back experienced staff to fulfill any additional staffing needs. Over time, however, this may become more difficult, in part because the center's staff must maintain independence (i.e., from DOE) in supporting NRC's regulatory role, according to the contractors.

Similarly, before NRC suspended the adjudication in 2011, DOE had identified 48 scientific or other experts to serve as DOE's witnesses during the adjudication's initial discovery phase. Of the 10 former DOE witnesses we contacted and from whom we received responses, 8 provided estimates of the time they would need to prepare to resume their previous role as a DOE witness (if they were offered, and accepted, the opportunity). The former witnesses' estimates ranged from a few weeks to 8 months to prepare to resume their previous role, with half of the 8 former witnesses estimating it would take them longer than 4 months to prepare.⁵⁵ Similarly, 8 of the 10 former witnesses provided us estimates for the amount of time it might take another expert with similar credentials but without Yucca Mountain-specific knowledge to assume the role of DOE witness. The estimates from these 8 former witnesses ranged from a few weeks to 3 years to prepare, with 6 of the 8 former witnesses estimating it would take another expert at least a year to prepare for this role. Five of the former witnesses commented that their estimates for their own or others' preparation time assumed that the necessary data and documents would be available. Two of the former witnesses said their estimates assumed that a quality assurance program for conducting and documenting scientific and technical work, among other organizational

⁵⁵The experts were responsible for various contentions that were to be addressed during the initial discovery phase. Before being identified as DOE expert witnesses in late 2009, each of the 8 experts had worked on the Yucca Mountain program, helped prepare DOE's license application, or both.

support, would be in place. Witnesses also said they assumed that the same or equally experienced legal experts would be involved. Four of the former witnesses commented that, to prepare for adjudication, a new expert would need to acquire extensive knowledge of the program and documentation, likely with some assistance from those who originally conducted the work. However, DOE officials said that it seemed unlikely a new expert would need multiple years to prepare, as the Yucca Mountain license application and underlying documentation were designed to be transparent and traceable for new experts and, if the licensing process resumed, DOE would likely provide support staff to help witnesses prepare.

As a second major action in this step, NRC, DOE, and the nonfederal parties would need to determine if previous work in connection with the licensing process—including the license application and EIS; NRC staff review documents, such as the Safety Evaluation Report; and party contentions—needs to be updated and to make the needed changes. For example, NRC may require DOE to show it has taken into account any new information that may affect its application or show that the new information does not affect the application in any significant way. DOE may also choose to update parts of its application to reflect any scientific, technological or other changes that may have occurred since the application was submitted in 2008. These changes might include, for example, the type or quantity of waste going into the repository. Although the Yucca Mountain license application specified that both spent nuclear fuel from commercial reactors and high-level defense nuclear waste would be permanently disposed of in Yucca Mountain, the NWPA allows for the possibility of separate repositories for these wastes, if the President finds that separate repositories were required. In 2015, the President released a memorandum for the Secretary of Energy communicating the President’s finding that a separate repository for defense waste was required,⁵⁶ and in 2016, DOE issued a draft proposal for such a repository.⁵⁷ Changes in the type or quantity of waste to be disposed of at Yucca Mountain could make it necessary to change the

⁵⁶White House, Office of the Press Secretary, “Presidential Memorandum—Disposal of Defense High-Level Radioactive Waste in a Separate Repository” (March 24, 2015).

⁵⁷Department of Energy, “Draft Plan for a Defense Waste Repository” (Washington, D.C.: December 2016). For more information on DOE’s efforts to develop a separate repository for defense waste, see GAO, *Nuclear Waste: Benefits and Costs Should Be Better Understood Before DOE Commits to a Separate Repository for Defense Waste*, [GAO-17-174](#) (Washington, D.C.: Jan. 31, 2017).

license application or other documents. In such cases, DOE officials said that they would review the application and could potentially rerun some of their models and calculations with current data to either identify needed updates or to confirm that no updates are needed. According to DOE, another approach would be to adjudicate the license application submitted in 2008 and, if NRC approves construction authorization, seek to amend the license to include any new or changed information.

Additionally, a further supplement of the repository EIS may be needed, according to DOE, because the EIS—except for the groundwater supplement that NRC issued in 2016—is now more than 8 years old. In December 2016, DOE officials told us that, if the licensing process resumes, they would likely need to conduct an analysis to determine whether a supplement would be required to account for new or changed information. If DOE were to make any changes to its license application, according to DOE and NRC officials, the NRC staff would need to formally review these changes and might need to issue updates to its own assessments of the application. According to ASLBP officials and NRC’s 2014 estimate for the House Appropriations Committee, such changes could lead to new or significantly amended contentions. Representatives of 2 of the nonfederal parties told us that when first filing contentions, they did not know what issues other parties were raising and may have missed opportunities to collaborate with other parties early on and possibly reduce the number of contentions. Now that all the parties know what contentions have been filed, the parties may be able to better identify areas for collaboration.

As a third major action in rebuilding organizational capabilities, the ASLBP and DOE would need to rebuild some physical infrastructure.

- **Hearing facility.** As previously mentioned, the ASLBP may need to reestablish a hearing facility in Las Vegas, which took approximately 24 months and \$2.4 million to locate and prepare for initial use. NRC and ASLBP officials told us they would have to wait for Commission decisions about where hearings would be held and under what schedule they would be conducted, but the ASLBP would potentially need time and money to rent and equip another hearing facility in or near Las Vegas. Officials said that, depending on the willingness of local lessors to rent them a building, among other factors, the timeline to rent and equip a facility may not take as long as it did previously, particularly if the previous facility is available. Any facility that is rented would need to be outfitted for hearings with audio-video equipment to enable live streaming and recording of conferences and hearings,

along with computers and display technology for activities such as witness examination and document display, according to NRC officials.

- **Licensing Support Network.** Depending on the format selected for the LSN, the ASLBP and others in NRC would need to reconstitute the LSN, provide a similar capability, or continue using NRC's agencywide document management system. NRC and ASLBP officials view the time and budget for this as largely dependent on Commission decisions. The LSN is a required part of the process under current NRC regulations, which call for a system that allows documents to be searched, uploaded and downloaded, and indexed. In memoranda from May 2010 and February 2011 to the licensing board appointed to manage discovery during the Yucca Mountain adjudication, the former LSN Administrator advised that, after 5 years, reviving the LSN in its previous form would become very difficult and after 10 years was unlikely to be successful, in part because of software and hardware changes and loss of LSN staff.⁵⁸ The LSN Administrator suggested, for the board's consideration, four potential alternatives to the original LSN, which the administrator had not analyzed for compliance with laws or NRC's regulations: (1) revert to the classic document discovery process wherein each party provides a copy of its documentary material to other parties; (2) call on each party to establish an internet search and retrieval capability of its own choosing; (3) upload the LSN into NRC's agencywide document management system; or (4) direct parties to submit their LSN materials, including bibliographic headers, to NRC in searchable PDF format for the NRC to upload into its official agency docket. Some NRC officials told us the NRC's agencywide system could be difficult to use as a stand-in for an LSN, while representatives for some of the nonfederal parties said that the agencywide system may be easier to use than the LSN or would likely suffice as a stand-in, given the time it could take to acquire a new system.
- **Site monitoring and DOE offices in Nevada.** DOE would need to rebuild some of its physical infrastructure and site monitoring in Nevada. When the Office of Civilian Radioactive Waste Management was shut down in 2010, leases for office space were terminated and office

⁵⁸See May 19, 2010, memorandum from Daniel Graser, LSN Administrator, to Construction Authorization Board 4 regarding "Licensing Support Network Administrator's Response to the Board's Questions Regarding the LSN" and Feb. 18, 2011, memorandum from Daniel Graser to this board regarding "Budgetary Support for Licensing Support Network."

equipment transferred, as we discussed earlier. Resuming the process could require DOE to acquire additional office space in Nevada, according to DOE officials. DOE might also need to resume its performance confirmation program, according to NRC regulations and DOE officials. The performance confirmation program was, as of 2010, made up of three types of measurements taken on the site: seismic monitoring, precipitation monitoring, and construction effects monitoring, according to a DOE official. Equipment may need to be replaced and measurements started again.

ASLBP Would Need to Reconvene the Parties, and the Parties Would Need To Complete the Remaining Phases of the Licensing Adjudication

The third step we identified is resuming the adjudication. Previously, licensing boards held conferences with the parties to gather input on details of the adjudication, including issues such as structuring the hearing schedule, and then issued orders governing the adjudication. While some of the decisions and directives previously issued in the adjudication may still be valid, the licensing board may need to consult with parties on other areas, such as the schedule for depositions. According to NRC, to resume the adjudication, an initial order lifting the suspension would likely come from the Commission; individual licensing boards may issue further orders, for example, to govern case management during the adjudication.

Once the adjudication resumes, parties would need to carry out depositions of party witnesses and complete discovery, and the ASLBP and the parties would need to conduct other aspects of the adjudication, such as submission and disposition of motions, evidentiary hearings, submission of proposed findings of fact and conclusions of law from parties, and licensing boards' decisions on the admitted contentions and initial decision on construction authorization.

The timeline for completion of the adjudication would be affected by the number of licensing boards that the ASLBP decides to use, as we noted above. Additionally, the number of new parties and contentions that are admitted, if any, as well as the scope of the contentions, could affect the timeline for completing the adjudication. In addition, more parties could take more time because of the need to integrate the added parties into the schedule for depositions and hearings, and more contentions could require more hearing days. Furthermore, additional contentions can lead to more opportunities for appeals to the Commission and appeals of Commission decisions to the U.S. Courts of Appeals.

The Remaining Steps of the Licensing Process Would Need to Be Completed

The fourth and final step we identified occurs when the adjudication of all the contentions is complete and the NRC Commission reviews the totality of information and notifies the Director of the Office of Nuclear Material Safety and Safeguards that its review is complete. If NRC authorizes construction of Yucca Mountain, according to NRC's regulations, the Nuclear Material Safety and Safeguards director would issue a construction authorization.

At present, there are at least two unresolved legal issues that would need to be addressed and that could affect the timeline for completing the licensing process. First, DOE may need to acquire the land and water rights it needs for construction authorization, according to NRC regulations and DOE and NRC officials. The NRC staff noted in its Safety Evaluation Report that NRC's regulations require that DOE control the land and water rights within the repository operations area before NRC can grant construction authorization, although officials told us that NRC could choose to include a condition that DOE obtain these rights in the construction authorization. The issue of land and water rights has been raised in an admitted contention and, as a result, may be addressed during the adjudication. The Department of the Interior and the Department of Defense currently control land for some portions of the Yucca Mountain site that DOE does not control. DOE officials told us that DOE previously obtained temporary land rights from the Department of the Interior's Bureau of Land Management and may need to go through a similar process again, if the Yucca Mountain licensing process resumes. However, to obtain the ownership required by NRC regulations and referred to in the Safety Evaluation Report, federal legislation would be needed to permanently withdraw the land for Yucca Mountain, according to DOE officials. Such a bill was introduced in the Senate in 2007 to request permanent land withdrawal for Yucca Mountain but was not enacted. Furthermore, water rights would need to be obtained from the state of Nevada. In the past, DOE has applied with the state of Nevada for permanent water rights to implement its responsibilities under the NWPAA. Although the state previously granted temporary permits for DOE to study the Yucca Mountain site, the Department of Justice has gone to federal court to obtain permanent rights; the court stayed that litigation in 2003. To construct and eventually operate a repository at Yucca Mountain, DOE acknowledges that it would need to obtain permanent water rights, and in the Safety Evaluation Report, the NRC staff concluded that DOE would need to obtain these rights in order to meet NRC regulatory requirements for construction authorization.

Second, a legal challenge questioning NRC's changes to its safety regulations for the repository's expected period of performance could also prolong the timeline for completing the licensing process. The Energy Policy Act of 1992 required EPA to issue public health and safety standards for radioactive material potentially stored or disposed of at Yucca Mountain, and the act required NRC to modify its technical requirements and criteria for Yucca Mountain to be consistent with EPA's standards. In 2008, EPA reissued the public health and safety standards for Yucca Mountain, using radiation dose standards applicable for a period up to 1 million years after disposal; in 2009, NRC reissued its regulations to make them consistent with EPA's standards. The state of Nevada brought two lawsuits in the D.C. Circuit Court challenging both the EPA and NRC regulations claiming, among other things, they fail to protect public health and safety. However, the licensing process was suspended shortly after the State of Nevada brought its lawsuits, so the circuit court held the lawsuits in abeyance pending further developments. In its Safety Evaluation Report, the NRC staff assumed the legal validity of the EPA and NRC standards for Yucca Mountain. If any aspect of the standards were to be struck down by a court in the future, then the conclusions of the Safety Evaluation Report—which, as noted above, found DOE's license application to meet the NRC standards—could be thrown into jeopardy. If so, NRC would likely have to change its regulations and require DOE to meet a more stringent standard for radiation exposure. This in turn could potentially result in DOE needing to revise its license application and NRC its Safety Evaluation Report, among other possible effects of such a ruling.

Agency Comments

We provided NRC and DOE a draft of this report for agency comment. The agencies provided us written comments, which are reproduced in appendixes II and III. In its written comments, NRC generally agreed with our findings. DOE did not indicate whether it generally agreed or disagreed. The agencies also provided technical comments and clarifications, which we incorporated as appropriate.

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, the Chairman of the NRC, the Secretary of Energy, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff members have any questions about this report, please contact me on (202) 512-3841 or ruscof@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Frank Rusco
Director, Natural Resources and Environment

Appendix I: Nuclear Regulatory Commission’s Primary Regulations for the Yucca Mountain Licensing Process

The Nuclear Regulatory Commission (NRC) is the independent regulator for the design, construction, operation, and eventual closure of a geologic repository at Yucca Mountain. NRC’s regulations define the safety or other standards for a proposed repository and outline the requirements for the Yucca Mountain licensing process (see table 1).

Table 1: Nuclear Regulatory Commission’s (NRC) Primary Regulations for the Yucca Mountain Licensing Process

Regulation	Description
10 CFR Part 2 – Agency Rules of Practice and Procedure	<p>Subparts C, G, and J provide general procedures for licensing adjudications and specific procedures for adjudication concerning construction authorization of a geologic repository. Subpart J includes rules pertaining to the Licensing Support Network.</p> <p>Appendix D, in accordance with the Nuclear Waste Policy Act outlines the required 1,125-day (3 years) time frame for NRC to review a license application from DOE and make a final decision to approve or disapprove construction authorization.</p>
10 CFR Part 51 – Environmental protection regulations for domestic licensing and related regulatory functions	<p>Section 51.67 requires DOE to submit to NRC for review any final Environmental Impact Statement (EIS) for a geologic repository. Under applicable provisions of law, DOE may be required to supplement its EIS, if DOE made substantial changes to its license application or determined significant new information has become available.</p> <p>In a licensing proceeding for construction authorization for a geologic repository, section 51.109 requires that the NRC staff provides its view about whether it would be “practicable” to adopt the EIS without supplementation. In the context of adjudication, an NRC licensing board would determine whether such adoption is practicable.</p>
10 CFR Part 63 – Disposal of high-level radioactive wastes in a geologic repository at Yucca Mountain, Nevada	<p>Provides environmental, public health, and safety requirements for the Yucca Mountain repository. Includes the required content of the license application; conditions for approving construction authorization; and technical, environmental, safety, and other requirements for the repository’s construction, operation, closure, and post-closure periods. Incorporates environmental and health standards developed by the U.S. Environmental Protection Agency.</p>

Source: GAO analysis of NRC regulations. | GAO-17-340

Appendix II: Comments from the Nuclear Regulatory Commission



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 5, 2017

Mr. Frank Rusco, Director
Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20226

Dear Mr. Rusco:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your e-mail dated March 2, 2017, which provided the NRC an opportunity to review and comment on the U.S. Government Accountability Office (GAO) draft report GAO-17-340, "Commercial Nuclear Waste: Resuming Licensing of the Yucca Mountain Repository Would Require Rebuilding Capacity at DOE and NRC, Among Other Key Steps."

The NRC staff appreciates the opportunity to review the draft report as well as the GAO staff's professionalism and constructive interactions during this GAO engagement. Overall, the NRC agrees with the draft report and its findings. In the enclosure to this letter, we have provided some minor comments and clarifications for your consideration, which may help to provide an accurate historical perspective of Yucca Mountain repository development and to clarify key steps that would be necessary should the licensing process resume.

Thank you again for the opportunity to provide comments on the draft GAO report. Please feel free to contact Mr. John Jolicœur at (301) 415-1642 or John.Jolicœur@nrc.gov if you have questions or need additional information.

Sincerely,

A handwritten signature in blue ink, appearing to read "Victor M. McCree".

Victor M. McCree
Executive Director
for Operations

Enclosure:
NRC Comments on Draft Report
GAO-17-340

Appendix III: Comments from the Department of Energy



Department of Energy

Washington, DC 20585

April 5, 2017

Mr. Frank Rusco
Director, Natural Resources
and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Mr. Rusco:

Thank you for providing a draft copy of the Government Accountability Office (GAO) report, *Commercial Nuclear Waste: Resuming Licensing of the Yucca Mountain Repository Would Require Rebuilding Capacity at DOE and NRC, Among Other Key Steps (GAO-17-340)*. We appreciate the effort GAO put into this review.

The draft report outlines four key steps needed to resume and complete the Nuclear Regulatory Commission licensing proceeding for a construction authorization for a repository at Yucca Mountain. Attached are several suggestions for clarification. If you have any questions, please contact Ms. Kelly Glanz at kelly.glanz@Nuclear.Energy.gov or (202) 586-4288.

Sincerely,

A handwritten signature in black ink, appearing to read "Raymond Furstenau".

Raymond Furstenau
Acting Assistant Secretary,
for Nuclear Energy

Attachment



Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Frank Rusco, (202) 512-3841 or ruscof@gao.gov.

Staff Acknowledgments

In addition to the contact named above, Hilary Benedict (Assistant Director), Kevin Bray, Greg Campbell, Alisa Carrigan, Cindy Gilbert, Katrina Pekar-Carpenter, and Jeff Rueckhaus made key contributions to this report.

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