Laurie

DATE: December 10, 2008
TO: Sue Tierney, Phil Niedzielski-Eichner, Skila Harris
FROM: Chris Kouts
SUBJECT: Information Request

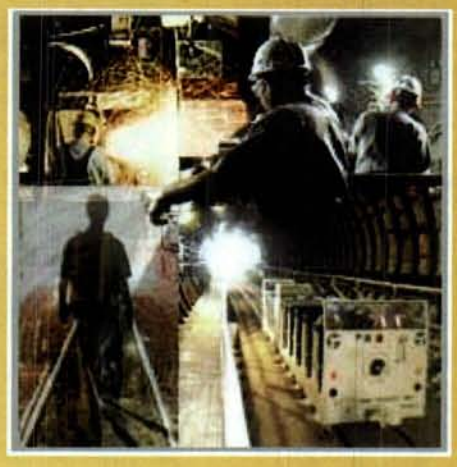
As requested, enclosed are copies of two reports released by the Department yesterday.

1.) "THE REPORT TO THE PRESIDENT AND THE CONGRESS BY THE SECRETARY OF ENERGY ON THE NEED FOR A SECOND REPOSITORY"

2.) "Report to Congress on the Demonstration of the Interim Storage of Spent Nuclear Fuel from Decommissioned Nuclear Power Reactor Sites"

Please let me know if you need additional information or have any questions.

DOE/RW-0595



THE REPORT TO THE PRESIDENT AND THE CONGRESS BY THE SECRETARY OF ENERGY ON THE NEED FOR A SECOND REPOSITORY

December 2008

U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Washington, D.C.

INTENTIONALLY LEFT BLANK

CONTENTS

FIGURES

THE REPORT TO THE PRESIDENT AND THE CONGRESS BY THE SECRETARY OF ENERGY ON THE NEED FOR A SECOND REPOSITORY

1. FINDING AND RECOMMENDATION

The Nuclear Waste Policy Act of 1982, as amended (NWPA), sets a statutory capacity limit of 70,000 metric tons heavy metal (MTHM) for the Nation's first spent nuclear fuel (SNF) and high-level radioactive waste (HLW) geologic repository, which has been designated by the Congress and the President to be sited in Yucca Mountain in Nye County, Nevada. Under the NWPA, this statutory limit on the amount of SNF and HLW to be disposed of at Yucca Mountain will remain in place until a second repository is in operation. The inventories of commercial and Federal Government SNF and HLW in the United States are projected to exceed 70,000 MTHM by 2010, therefore additional repository capacity is needed. The 70,000 MTHM statutory limit for the first repository is not based on any technical considerations related to Yucca Mountain, and studies indicate that the repository layout at Yucca Mountain can be expanded to accommodate three times, or more, the current statutory limit of 70,000 MTHM. This capacity would be sufficient for disposing of the SNF from the existing fleet of reactors, even if all of their licenses are extended to allow them to operate for 60 years. If the number of nuclear power plants grows, a second repository may ultimately be needed beyond expansion of Yucca Mountain. The Secretary of Energy recommends that, consistent with legislation that the Administration proposed in 2007, Congress act promptly to remove the statutory limit of 70,000 MTHM for the Yucca Mountain repository, thereby permitting a deferral of a decision regarding the need for a second repository. This deferral allows for the decision regarding a second repository to consider how much additional capacity is needed, whether or not recycling of SNF is appropriate and should be implemented, and what waste management approaches for the additional SNF may be most appropriate.

2. EXECUTIVE SUMMARY

The Nuclear Waste Policy Act of 1982, as amended (NWPA), establishes a process for the siting, construction and operation of one or more national repositories for permanent disposal of the Nation's spent nuclear fuel (SNF) and high-level radioactive waste (HLW). In 1987, after the Department of Energy (the Department or DOE) had conducted studies of nine potential repository sites located throughout the United States, Congress amended the NWPA and selected the Yucca Mountain site in Nye County, Nevada as the only site for further study for the first national repository. In 2002, Congress passed and the President signed Public Law 107-200, which approved Yucca Mountain as the site for that repository. On June 3, 2008, the

Department submitted a license application to the Nuclear Regulatory Commission (NRC) seeking construction authorization for the repository at Yucca Mountain.

This report is prepared pursuant to Section 161 of the NWPA[i], which requires the Secretary of Energy (the Secretary) to report to the President and to the Congress on or after January 1, 2007, but not later than January 1, 2010, on the need for a second repository. In preparing this report, the Department has considered the relevant statutory provisions of the NWPA, the current and projected inventories of SNF and HLW, and the projected capacity of the proposed Yucca Mountain repository.

In particular, the Department has considered the provisions of the NWPA which currently set a statutory capacity limit on the amount of commercial and government-owned SNF and HLW that can be emplaced in the Nation's first repository to 70,000 metric tons of heavy metal (MTHM), until a second repository is in operation. Specifically, Section 114(d) of the NWPA[ii] "prohibit[s] the emplacement in the first repository of a quantity of spent fuel containing in excess of 70,000 metric tons of heavy metal or a quantity of solidified high-level radioactive waste resulting from the reprocessing of such a quantity of spent fuel until such time as a second repository is in operation."

The Department has also considered President Reagan's decision in 1985, pursuant to Section 8 of the NWPA, to use the disposal capacity of the first repository for the disposal of HLW, including DOE and U.S. Navy SNF, resulting from national defense activities. Subsequent to President Reagan's decision, the Department established a policy to allocate ninety percent (90%) of the first repository capacity (in MTHM) to civilian SNF and ten percent (10%) of the repository capacity to Department-managed SNF and HLW. Accordingly, 63,000 MTHM of the 70,000 MTHM statutory limit is allocated to civilian waste and 7,000 MTHM of the 70,000 MTHM statutory limit is allocated to national defense waste.

The Department has considered that there is currently more than 58,000 MTHM of commercial SNF in storage in the United States, and the total inventory of commercial SNF continues to increase at a rate of about 2,000 MTHM per year. DOE expects that, by 2010, commercial nuclear power plants will have generated the entire amount of commercial SNF (that is, 63,000 MTHM) that is allocated for disposal in the Yucca Mountain repository under the current statutory cap. Assuming all existing operating nuclear reactors in the United States request license extensions from the NRC to operate for 60 years, the amount of commercial SNF from these reactors in the United States requiring permanent disposal is projected to be approximately 130,000 MTHM. Further, there is currently approximately 12,800 MTHM of DOE SNF and HLW, including naval SNF, in storage at government sites. This quantity exceeds the 7,000 MTHM of national defense waste allocated for disposal in the Yucca Mountain repository. Additionally, nuclear utilities have expressed their intention to file, by the end of 2010, license applications seeking approval for the construction and operation of 34 new nuclear reactors. If these reactors become operational, they would substantially increase the amount of nuclear generation and will result in additional spent nuclear fuel requiring disposal. **Unless Congress raises or eliminates the current statutory capacity limit of 70,000 MTHM in the NWPA, the Nation will need a second repository for SNF and HLW.**

To address this need, the Department has further considered the following three alternatives and possible ways to move forward:

(1) Remove the statutory limit of 70,000 MTHM for Yucca Mountain and dispose of currently projected quantities of SNF and HLW at the Yucca Mountain repository;

(2) Begin the process of siting, designing, licensing and constructing a second repository as soon as possible so it will be ready to receive SNF and HLW by the time 70,000 MTHM has been emplaced in the Yucca Mountain repository; or,

(3) Defer the decision and prolong the time commercial SNF generated after 2010 will be stored at reactor sites, as well as the time DOE SNF and HLW will be stored at DOE sites.

In addressing the first alternative of removing the statutory limit and placing more than 70,000 MTHM of SNF and HLW at Yucca Mountain, the Department has considered the additional area available for disposal at Yucca Mountain. The 70,000 MTHM statutory limit that Congress established in 1982 for the first repository is not based on any technical considerations related to Yucca Mountain. Studies indicate that three times, or more, this statutory limit could be accommodated by expanding the repository layout at Yucca Mountain.

In addressing the second alternative of developing a second repository, the Department has considered previous work performed to identify candidate repository sites. That work shows that all states in the contiguous United States have an identified potential site or area that could be considered for a second repository.

In considering the third alternative of deferring a decision, the Department has considered the impacts of leaving uncertain the disposal path for the commercial SNF and national defense waste in excess of the current 70,000 MTHM statutory limit. Each year a decision is deferred, the Federal Government will incur additional financial liabilities. In addition, deferral of a decision increases the possibility the Department will be unable to honor, in a full and timely manner, its commitments to states that currently store national defense HLW and SNF within their borders—including Washington, Idaho, and South Carolina, among others.

Finally, the Department has also considered legislative actions that would be needed to implement the alternatives. The first alternative would require removing the current statutory limit of 70,000 MTHM, as the Administration has proposed previously. The second alternative would require legislative action to specify the process for siting, design, licensing and constructing a second repository. The third alternative would require Congressional direction to the Department on how to address the damages resulting from the delay and on what to do with the HLW and SNF that could not be placed in Yucca Mountain.

As set forth more fully below, the Secretary recommends that the preferred course of action is legislative removal of the statutory capacity limit of 70,000 MTHM. Removal of this statutory limit would defer the urgency in evaluating the issues associated with a second repository.

3. HISTORY OF THE NWPA

When first enacted in 1982, the NWPA provided for the development by the Department of two geologic repositories. Specifically, the NWPA directed the Department to identify three candidate sites for the first repository and to conduct a multi-year evaluation of each of the sites. The site characterization process was to be repeated for a second set of sites for the second repository. The Department was directed to issue general guidelines for the program, which were finalized in December 1984 as General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories (10 CFR Part 960). In addition, the NWPA[iii] established a statutory limit on the quantity of SNF that could be emplaced in the first repository until such time as a second repository is in operation. This statutory limit is 70,000 MTHM, or a comparable quantity of solidified HLW resulting from the reprocessing of such a quantity of SNF.

Through passage of the Nuclear Waste Policy Amendments Act of 1987 (the Amendments Act), Congress redirected the Department to focus its site characterization activities only at Yucca Mountain, Nevada. The Amendments Act also terminated site-specific activities at all candidate sites other than the Yucca Mountain site (i.e., the Deaf Smith County, Texas and Hanford, Washington sites). The Amendments Act also banned future site-specific activities with respect to a second repository unless and until Congress specifically authorizes and appropriates funds for such activities, and requires the Secretary to report to the President and to Congress on or after January 1, 2007, but not later than January 1, 2010, on the need for a second repository. The Amendments Act did not modify the statutory capacity limit of 70,000 MTHM for the first repository.

In 2002, in accordance with the framework established by the NWPA, as amended, the Secretary recommended the Yucca Mountain site to the President for development as a repository. The President accepted the Secretary's recommendation and submitted the recommendation to Congress. Subsequently, the Governor of Nevada submitted a Notice of Disapproval. Congress passed a joint resolution approving the Yucca Mountain site for development and the President signed the resolution into law (Public Law 107-200).

4. FUNDING FOR SNF AND HLW DISPOSAL ACTIVITIES

The NWPA authorizes the Secretary to enter into contracts with utilities for the acceptance and disposal of SNF. The terms for these contracts, which are known as the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract), are set forth in 10 CFR Part 961. The Department has executed contracts with individual utilities operating the nation's current fleet of nuclear power plants. The Standard Contract provides that, in return for the payment of fees, the Department will take title to and dispose of SNF covered by the contract as expeditiously as practicable following commencement of operation of a repository, beginning not later than January 31, 1998. The failure of DOE to begin acceptance of SNF under the contracts has been the subject of litigation between DOE and the utilities.

The Standard Contract also provides for the payment of fees into the Nuclear Waste Fund to fund activities associated with the disposal of civilian SNF. Those fees have to date been set at 1.0 mill (one-tenth of one cent) per kilowatt-hour, on the commercial generation of nuclear power by contract-holders. The Secretary must review the fee annually to determine its

adequacy, and propose adjustments, as needed, to ensure full cost recovery. In addition, costs associated with the disposal of DOE SNF and HLW are paid by appropriations of general revenue funds.

5. WASTE STREAM FOR DISPOSAL

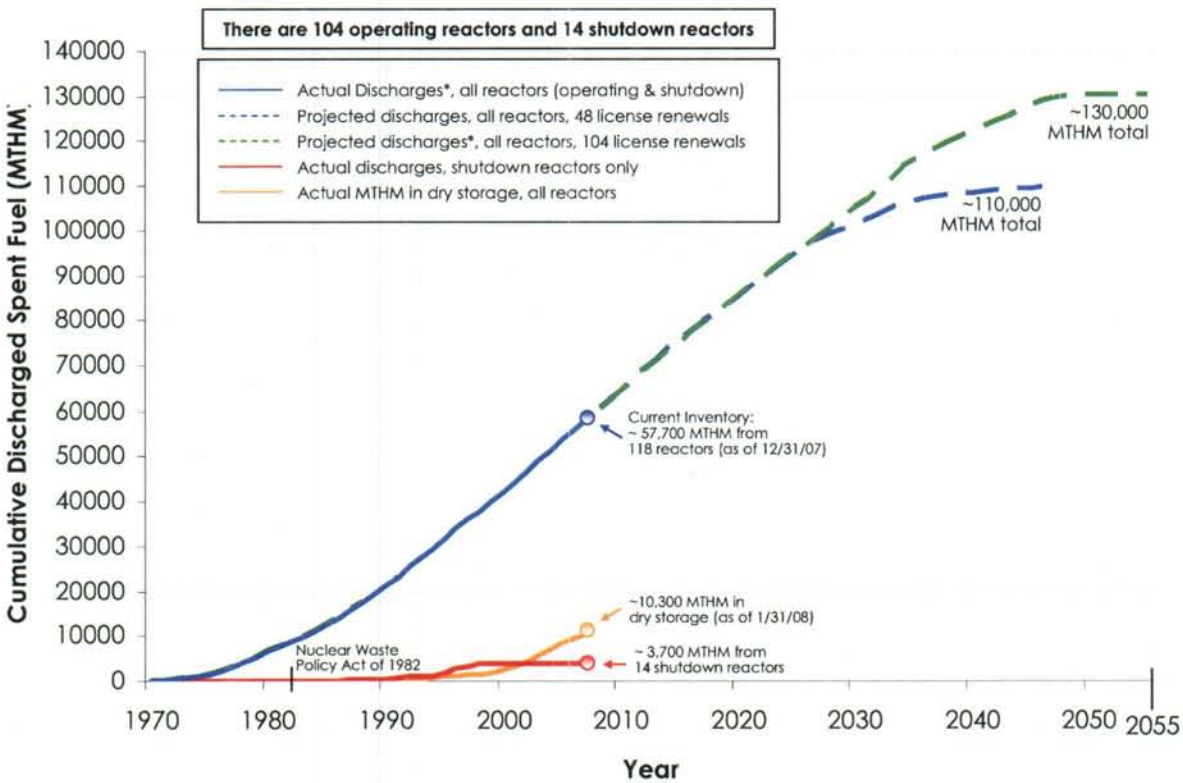
The SNF and HLW planned for disposal in Yucca Mountain consists of two principal types: 1) commercial SNF generated by nuclear power reactors and 2) DOE SNF and HLW. The inventory of material at DOE sites is essentially fixed, and consists principally of DOE SNF resulting from government nuclear weapons programs, research reactors, reactor prototypes, and nuclear-powered naval vessels; and HLW created from reprocessing commercial and DOE SNF. Only the inventory of naval SNF, which is critical to the Nation's national security needs, continues to increase materially. The inventory of material at DOE sites is approximately 2,500 MTHM of DOE SNF and approximately 10,300 MTHM of DOE HLW, for a total of approximately 12,800 MTHM[iv]. This exceeds the 7,000 MTHM portion of the 70,000 MTHM statutory limit for Yucca Mountain that is currently allocated to DOE SNF and HLW.

The commercial SNF inventory, which includes commercial SNF generated by 104 operating reactors and 14 reactors that have ceased operation, currently is approximately 58,000 MTHM and is increasing by approximately 2,000 MTHM annually. It is also possible to make reasonable projections of the total amount of spent fuel that will be generated by the existing fleet. The major variable in making projections concerning future generation of commercial SNF from the existing fleet is the issuance of 20-year operating license extensions to many reactors (for a possible total lifetime of 60 years). As of January 2007, 47 license extensions had been granted. Figure 1 shows the historical and projected commercial SNF inventory if all currently operating reactors operate to the end of their licensed lifetimes (note that currently, no reactor has operated even to the end of its initial 40 year license). Projections are shown for a case that assumes only 47 reactor-life extensions and a bounding case that assumes all 104 operating reactors receive life extensions. The 47 reactor-life extension projection is approximately 109,300 MTHM, and the 104 life extension projection is approximately 130,000 MTHM. It should be noted that, regardless of the number of life extensions assumed, the current 63,000 MTHM portion of the 70,000 MTHM statutory limit for Yucca Mountain that is allocated to commercial SNF will be exceeded by 2010.

The projections used in preparing this report do not include any commercial SNF from the future operation of possible new reactors. The projections used in this report also do not take into account the possible effects of any decision to proceed with any of the reprocessing options being considered as part of the Global Nuclear Energy Partnership (GNEP) initiative. The current 70,000 MTHM statutory limit as defined in the NWPA pertains to the heavy metal content of the original fuel. As a result, from a repository capacity standpoint, it does not matter if SNF is emplaced as the original spent fuel rods or the SNF is reprocessed and only the resulting HLW is emplaced. Only the waste forms that originate from 70,000 MTHM can be emplaced. In any event, all reprocessing technologies under consideration as part of the GNEP initiative would produce wastes requiring disposal in a repository and moreover, deployment of reprocessing technologies would have little, if any, effect on the quantity of DOE SNF and HLW as they are not likely candidates for reprocessing.

It should be noted, however, that under a scenario where the number of future new nuclear plants grows substantially, the use of reprocessing technologies would extend the use of the Yucca Mountain repository, and if a second repository ultimately is necessary, would also prolong the use of that repository. Further, to the extent that reprocessing reduces or eliminates the need for retrievability of waste between the time it is emplaced in a repository and closure of that repository, this could result in increased operational efficiencies, lower costs for repository construction and operations, and open additional geologic media, such as salt formations, to consideration.

As far as the conclusions contained in this report are concerned, the projections of waste considered in this report are based on reasonable assumptions reflecting current policy, and speculation as to future policy has been limited to the extent practicable.



Sources: * Based on actual discharge data as reported on RW-859's through 12/31/02, and projected discharges, in this case, based on 104 license renewals.

Figure 1. Historical and Projected Commercial SNF Generation Inventory from Existing Fleet (if all currently operating reactors operate to the end of their licensed lifetimes)

6. THREE ALTERNATIVES CONSIDERED

A repository at Yucca Mountain subject to the NWPA statutory capacity limit of 70,000 MTHM cannot accommodate the projected amount of 122,100 MTHM. The 63,000 MTHM allocation for commercial SNF within the 70,000 MTHM statutory capacity limit will be reached by SNF discharged by existing reactors by 2010, well before the Yucca Mountain repository begins operations. Accordingly, there is a need for additional repository capacity beyond the current statutory limit on the Yucca Mountain repository if the Department is to be able to carry out the mandate of the NWPA to provide for the disposal of defense and commercial SNF and HLW produced in the United States. If the statutory limit on the Yucca Mountain repository is not lifted, then a second repository will be needed.

The Department has considered three alternatives for addressing this need for disposal capacity beyond the 70,000 MTHM limit:

- Removing of the statutory limit of 70,000 MTHM for Yucca Mountain and disposal of currently projected quantities of SNF and HLW at the Yucca Mountain repository;
- Beginning the process of siting, designing, licensing and constructing a second repository as soon as possible so it will be ready to receive SNF and HLW by the time 70,000 MTHM has been emplaced in the Yucca Mountain repository; or
- Deferring the decision and prolonging the time commercial SNF generated after 2010 will be stored at reactor sites, as well as the time DOE SNF and HLW will be stored at DOE sites.

6.1 REMOVING THE STATUTORY LIMIT OF 70,000 MTHM FOR YUCCA MOUNTAIN

The NWPA provides no limit on the amount of SNF and HLW disposed of in the first repository after a second repository begins operation.

Lifting the statutory limit of 70,000 MTHM would provide a substantial increase in the capability of the Department to accept SNF and HLW for disposal without the need for a second repository. It would avoid the additional costs and timing uncertainties associated with an effort to site and develop a second repository. The Yucca Mountain repository would likely have sufficient capacity to dispose of the entire defense waste inventory plus the commercial SNF expected to be produced by the existing fleet of nuclear power reactors. The conclusion that removing the 70,000 MTHM limit on the Yucca Mountain repository can meet the currently projected needs for additional disposal capacity is based on studies indicating that Yucca Mountain has the physical capability to allow disposal of a much larger inventory. The 70,000 MTHM statutory limit on capacity of the first repository until a second repository is in operation is not based on any technical considerations related to the characteristics of possible repository sites or geologic media.

The Physical Capacity of Yucca Mountain

The current repository layout encompasses 1250 acres. Past studies examined design layouts that encompass as much as 4200 acres; this is more than three times the area of the layout used to accommodate 70,000 MTHM.

The 70,000 MTHM limit on the amount of waste that can be placed in the first repository is a statutory capacity limit, and the limit only applies until a second repository is in operation. If that statutory limit was removed, the amount of waste that could be placed in a Yucca Mountain repository would be a function of design constraints that address the heat load that the waste would introduce in the rock mass and the volume of rock of sufficient quality to allow the design to meet the constraints. The heat load, which is a function of burn-up and age of the SNF, is dictated by which SNF is shipped to the repository (referred to as the waste stream), how the SNF is loaded in waste packages, whether the waste packages are aged prior to emplacement, and the spacing or sequencing of waste packages when emplaced. The length of ventilation time prior to repository closure is also a key parameter in determining the amount of waste that can be placed in a given volume of rock. The volume of rock is dictated by the geologic characteristics of the site.

As the design of the repository evolved, DOE undertook additional studies[v] of potential expansion areas. Questions and comments related to both the capacity of Yucca Mountain and the types of waste that could be placed in a repository led the Department to evaluate the cumulative impacts for an inventory larger than the Proposed Action in the 2002 Final Environmental Impact Statement (Final EIS)[vi] prepared at the time of Site Recommendation. The additional waste considered consisted of the remainder of the total projected inventory of commercial SNF, DOE SNF and DOE HLW.

The current repository layout encompasses 1,250 acres at a thermal load of approximately 55 to 60 MTHM/acre. Past studies have shown design layouts that encompass as much as 4,200 acres, which is more than three times the area of the layout currently used to accommodate 70,000 MTHM (Figure 2). Also, recent thermal loading studies[vii] indicate that the allowable thermal load is greater than the 55 to 60 MTHM/acre value currently used. More importantly, those studies, which are based on extrapolation of data from the area that has been characterized in detail for the 70,000 MTHM inventory in the Yucca Mountain license application to NRC, indicate that significantly greater thermal loads can be accommodated by extending the time that the repository is open and ventilated prior to repository closure.

Taken together, those studies provide confidence that a repository at Yucca Mountain has the capacity to handle all of the DOE SNF and HLW and the projected inventory of commercial SNF assuming operating life extensions for all of the existing commercial nuclear power reactors.

An independent study[viii] found similar results, concluding that the current statutory limit on Yucca Mountain disposal capacity is a small fraction of the actual available physical disposal capacity at the Yucca Mountain site. That study concluded that at least four times this statutory limit established by Congress could be emplaced at Yucca Mountain, and that, with additional site characterization, potentially as much as nine times the statutory limit could be emplaced.

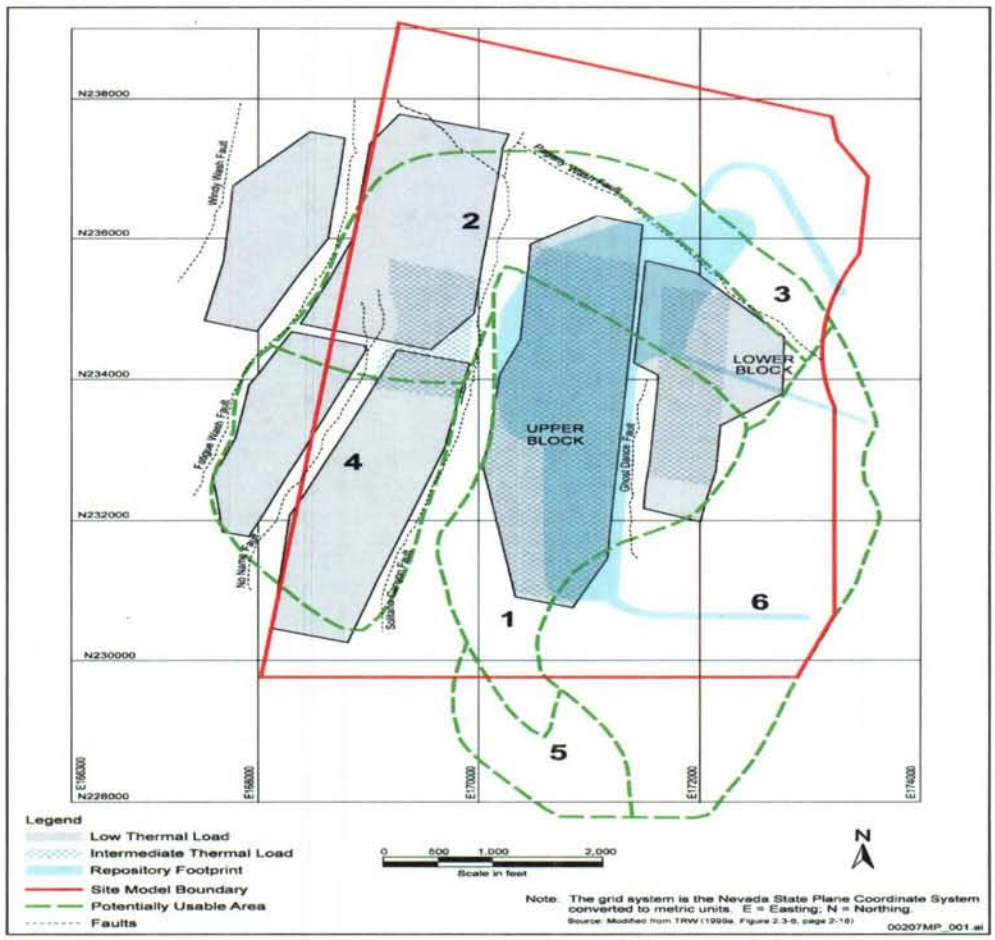


Figure 2. Potential Repository Emplacement Areas (after Mansure and Ortiz) [ix]

Total of potential emplacement areas is 9,500 acres. Also shown are current and past repository layouts and areas.

6.2 BEGINNING THE PROCESS OF SITING, DESIGNING, LICENSING, AND CONSTRUCTING A SECOND REPOSITORY AS SOON AS POSSIBLE

If the statutory limit of 70,000 MTHM is not modified, a second repository is needed. Due to specific limitations included in the NWPA,[x] new authorizing legislation and specific appropriations would be needed before the Department could conduct any site-specific work on a second repository. In addition, specific authorization would be needed to construct a second repository since the NWPA authorizes only the first repository and limits use of the Nuclear Waste Fund to construction of facilities specifically authorized by law. Finally, the Amendments Act deleted the provisions relating to siting a second repository and amended the key provisions in Section 114 relating to site recommendation, National Environmental Policy Act requirements, and licensing to apply specifically to Yucca Mountain. These changes leave the process for siting and licensing a second repository undefined.

The analysis in this report assumes a second repository would have to begin operation by 2041 in order to permit DOE to continue waste acceptance without disruption. This assumption is based on emplacing the 70,000 MTHM permitted by current law in Yucca Mountain by 2041. The schedule for the second repository assumes that the siting, designing, licensing, and construction process for the second repository would begin in 2011, allowing 28 years for the completion of that process. The 1987 Mission Plan Amendment, issued before the Amendments Act was passed, presented a schedule for siting and developing a second repository following a national site survey. The process was estimated to take about 28 years. That estimate was based on use of the second repository provisions of the NWPA of 1982, which specified the details of the siting and licensing process. That period may be considered optimistic, since the time between the start of the first repository siting process in 1983 and the earliest possible start of operations at Yucca Mountain in 2020 is 37 years.

In addition, the need for legislation before any site-specific work could be performed introduces substantial uncertainty into the schedule for a second repository. Opening the NWPA to reinstate a second repository program could reopen all of the issues about the siting process that took years of congressional effort to resolve prior to passage of the Act in 1982 – the role of host states, the number of sites to be characterized, criteria for guidelines, the site recommendation process, voluntary versus directed siting, and other matters. One approach would be simply to reinstate the deleted second repository provisions and add authorization for construction of a second repository. Even then, however, the elimination of parallel characterization of three sites for the first repository in 1987 suggests that the number of sites to be characterized for a second repository would need to be revisited.

Assuming the process must begin around 2011 to avoid a halt in receipts between the time Yucca Mountain reaches the statutory limit and the second repository is in operation, Congressional action to establish the siting process and provide the needed funding would be needed by 2010.

Siting a Second Repository

If the Congress chooses not to raise or eliminate the statutory cap on the disposal capacity at Yucca Mountain and instead chooses to authorize a second repository program, the most efficient path to identifying potential sites for a second repository would be to start with the other sites and areas that were under consideration for either the first or second repository before the Amendments Act was passed. The nine sites comprising the first Repository Screening Program were:

First Repository Sites	Geologic Media
Vacherie Dome, Louisiana	Dome salt
Cypress Creek Dome, Mississippi	Dome salt
Richton Dome, Mississippi	Dome salt
Yucca Mountain, Nevada	Tuff
Deaf Smith County, Texas	Bedded salt
Swisher County, Texas	Bedded salt
Davis Canyon, Utah	Bedded salt
Lavender Canyon, Utah	Bedded salt
Hanford Site, Washington	Basalt flows

DOE reference documents[xi] prepared in the same timeframe identify 17 states within which there were granitic bodies believed to be adequate for investigation for siting a repository for the second repository program. The states identified included:

Minnesota	Wisconsin
Michigan	Maine
New Hampshire	Vermont
Massachusetts	Connecticut
Pennsylvania	New York
New Jersey	Delaware
Maryland	Virginia
North Carolina	South Carolina
Georgia	

Supporting references[xii, xiii] identify eight additional states under consideration by the crystalline rock program as having granitic bodies that could be adequate for investigation for siting a repository for the second repository program:

Washington
Idaho
Arizona
Wyoming
Texas
Alabama
South Dakota
Oklahoma

Therefore, from the original first and second repository programs a total of 31 states have been identified that have potential sites or areas that could be evaluated for their potential for a second repository. These states are illustrated on Figure 3.

In the 1987 Mission Plan Amendment released before passage of the Amendments Act, the Department described an alternative program for proceeding with a second repository that started the second repository program over again with a national site screening process that would expand the types of geologic media and number of geographical areas considered. Some work already existed at that time to provide a basis for such an alternative approach. For example, in order to increase the diversity of rock types under consideration by the geologic repository program, the Department had initiated the Sedimentary Rock Program (SERP) in 1984. The objective of this program was to evaluate five types of sedimentary rock (sandstone, shale, chalk, carbonate rocks, and anhydrock) to determine the potential for locating a geologic repository site in one of these rock types. In that evaluation,[xiv] shales were found to be equal to, or better than, the other four rock types.[xv] Hard or rocklike shales having the favorable characteristics leading to this conclusion occur extensively in the conterminous United States.

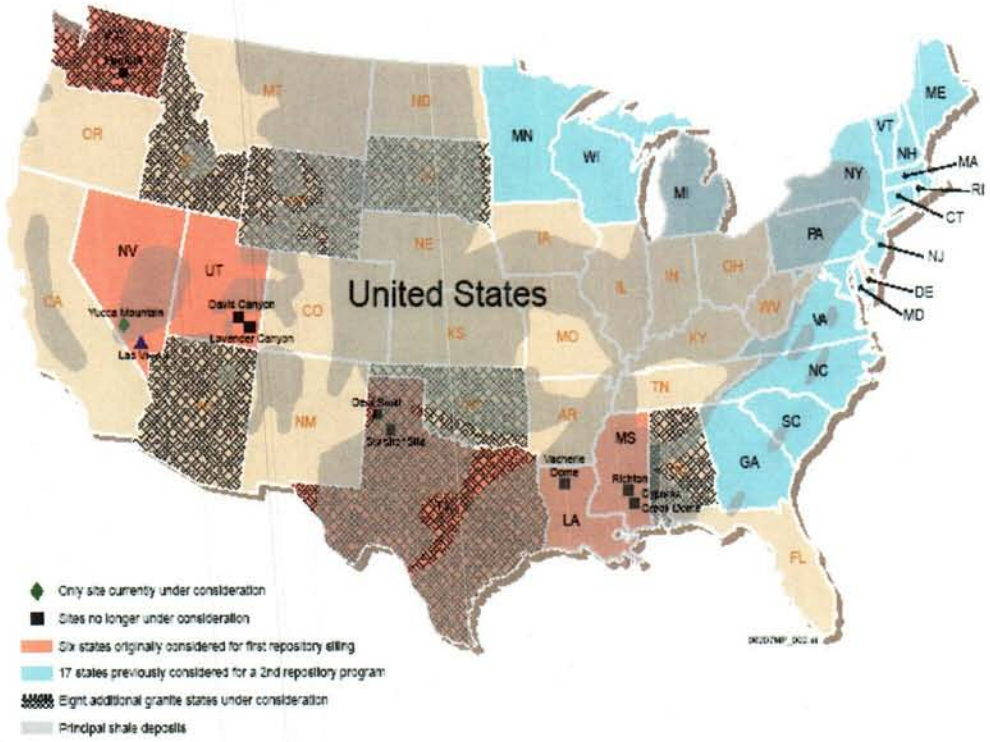


Figure 3. Map of the United States Illustrating First Repository Program Sites, Second Repository Program Areas Under Consideration, and Shale Deposits Potentially Suitable for a Repository

The outline of these shale deposits is overlain on Figure 3. This figure shows that, with the addition of states that have potentially suitable shale deposits, all states in the contiguous United States have a potential area that could be considered for the second repository.

6.3 DEFERRING THE DECISION

If the statutory limit of 70,000 MTHM is not modified, and the decision to build a second repository is deferred indefinitely, this would raise a number of significant issues. The Department has assessed the impacts of deferring such a decision. As a general matter, deferring this decision would prolong the time commercial SNF generated after 2010 will be stored at reactor sites, as well as the time DOE SNF and HLW will be stored at DOE sites. As noted previously, by 2010 the inventory of SNF generated by commercial nuclear power reactors will reach 63,000 MTHM which is the portion of the 70,000 MTHM statutory limit allocated to commercial SNF. Thus, if the current statutory cap remains in place, commercial SNF generated after 2010 cannot be emplaced in a repository until a second repository begins operation. Also, as noted previously, about half of the DOE SNF and HLW (approximately 5,800 MTHM) cannot be emplaced in a repository until a second repository begins operation.

With respect to commercial SNF, deferral of a decision would likely result in additional liabilities under the Standard Contracts. Under federal court decisions related to the Department's failure to begin accepting waste for disposal in 1998, as required by current law,

the Department has been found to be liable for certain damages attributable to the delay in SNF acceptance. In a 2002 decision, the 11th U.S. Circuit Court of Appeals held that the Department is not authorized to spend Nuclear Waste Fund monies on settlement agreements compensating the utilities for their onsite storage costs.[xvi] Rather, damages are paid by federal taxpayers through the U.S. Treasury's Judgment Fund. DOE has estimated that the liability associated with the delay in waste acceptance, based upon the beginning of operations at Yucca Mountain in 2020, and continuing without interruption until all the spent nuclear fuel has been received, may be up to $11 billion, and could increase significantly for each additional year operations are delayed or interrupted.

Deferring a decision on the second repository until a choice is made whether to pursue one of the reprocessing options currently under consideration does not affect the analysis concerning commercial SNF. As noted previously, application of the current 70,000 MTHM statutory limit is the same whether SNF is emplaced as the original spent fuel rods or the SNF is reprocessed and only the resulting HLW is emplaced. In addition, while reprocessing offers the potential to make the fuel cycle and disposal more efficient, there is no basis to speculate what, if any, volume of SNF generated before the deployment of reprocessing technology will be reprocessed. It is highly uncertain to what extent the economic and technical factors that would support the business case for reprocessing SNF as it is being generated would also support the reprocessing of legacy SNF.

Deferring action also increases uncertainties about final disposition of the DOE HLW and SNF that is not included in the 7,000 MTHM portion of the 70,000 MTHM statutory limit allocated to national defense waste. Lack of any knowledge about the characteristics of the site and repository design that might be used for disposal of this material complicates decisions about final waste solidification and other steps in preparation for disposal. Uncertainty about the timing of availability of the needed additional disposal capacity would also complicate planning for final cleanup and decommissioning of the sites and facilities where the material is now stored. Continued deferral of a decision to add that disposal capacity will add to the costs of management at the current sites, and could threaten the Department's ability to fulfill agreements with the states hosting those sites to remove the waste for permanent disposal.

7. POTENTIAL LEGISLATIVE ACTIONS

Legislative action is required for the first and second alternatives and most likely is required for the third alternative. Using the Yucca Mountain repository for all of the projected SNF and HLW would require elimination of the 70,000 MTHM statutory limit. The Administration already has proposed legislation to accomplish this objective. Deciding to proceed with a second repository also would require legislation to authorize the repository and to specify how the second repository would be sited and licensed. While deferring the decision on the second repository does not require legislation to implement, it most likely would produce results that would require Congressional actions, such as direction on how to deal with the failure to honor contracts concerning commercial SNF and commitments and agreements concerning DOE SNF and HLW.

8. CONCLUSIONS

This report concludes that considerably more than 70,000 MTHM of SNF and HLW will require disposal in a geologic repository. In fact, at this time there is more than 58,000 MTHM of commercial SNF in storage, increasing at a rate of about 2,000 MTHM per year, and approximately 12,800 MTHM of SNF and HLW in storage at government sites. The inventory of waste materials planned for disposal in Yucca Mountain, which includes 7,000 MTHM of DOE SNF and HLW in addition to the commercial SNF, will reach the 70,000 MTHM statutory capacity limit in 2010.

A repository at Yucca Mountain that remains subject to the current NWPA statutory capacity limit of 70,000 MTHM cannot accommodate all of the currently projected commercial and DOE and U.S. Navy SNF and HLW. If the statutory limit on the first repository is not lifted, then a second repository will be needed. However, studies indicate that three times the statutory limit of 70,000 MTHM, or possibly more, could be accommodated by expanding the repository layout at Yucca Mountain. Lifting the statutory limit on the disposal capacity at Yucca Mountain provides an opportunity to defer the need to reassess repository capacity requirements. During this deferral period the future growth of nuclear energy and impacts from nuclear fuel recycling will become more clear, enabling a more informed decision regarding the need for a second repository. Based on the above, the Secretary of Energy recommends that Congress act promptly to remove the statutory limit of 70,000 MTHM for the Yucca Mountain repository and defer a decision regarding the need for a second repository.

Endnotes

[i] Public Law 97-425, Jan.7, 1983, Section 161(b) [42 U.S.C.10172(b)]

[ii] Public Law 97-425, Jan.7, 1983, Section 114(d) [42 U.S.C. 10134(d)]

[iii] Public Law 97-425, Jan.7, 1983, Section 114(d) [42 U.S.C. 10134(d)]

[iv] Huizenga, D. 2001. "Integrated Acceptance Schedule for Department of Energy Spent Nuclear Fuel and High-Level Waste." Memorandum from D.G. Huizenga (U.S. DOE Office of Environmental Management [EM]) to L.H. Barrett (OCRWM). July 11, 2001. ACC: MOL.20010821.0087.

[v] CRWMS M&O, 1995, Generic Subsurface Layouts for Various Repository Thermal Loadings. BC000000-01717-5705-00002, Rev. 00

[vi] DOE 2002. Final Environment Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada. DOE/EIS-0250. Washington, D.C.: U.S. DOE Office of Civilian Radioactive Waste Management (OCRWM). ACC: MOL.20020524.0314 through MOL.20040524.0320

[vii] DOE 2008. Postclosure Analysis of the Range of Design Thermal Loadings, concurrence review copy dated January 2008. ANL-NBS-00057 Rev. 00C.

[viii] Electric Power Research Institute, 2006, Analysis of the Maximum Disposal Capacity for Commercial Spent Nuclear Fuel in a Yucca Mountain Repository, 1013523, Technical Update.

[ix] Mansure, Arthur J., and Terri Smith Ortiz, 1984, Preliminary Evaluation Of The Surface Area Available For A Potential Nuclear Waste Repository At Yucca Mountain, Sandia Report, SAND84-0175.

[x] Section 161 of the NWPA provides that the Secretary may not conduct site-specific activities with respect to a second repository unless Congress has specifically authorized and appropriated funds for such activities. 42 U.S.C. 10172a.

[xi] DOE 1985. Mission Plan for the Civilian Radioactive Waste Management Program, Vol. I. DOE/RW-0005 Volume 1 of 3 volumes, p. 40 for six states originally considered for first repository siting, p. 42 for the 17 states considered for potential second repository crystalline (granite) sites.

[xii] OCRD, 1983 A National Survey Of Crystalline Rocks And Recommendations Of Regions To Be Explored For High-Level Radioactive Waste Repository Sites Office of Crystalline Repository Development, OCRD-1 [Fig 17].

[xiii] DOE, 1986. Draft Area Recommendation Report for the Crystalline Repository Project U.S. Department of Energy, Office of Civilian Radioactive Waste Management, Crystalline Repository Project Office, DOE/CH-15(0).

[xiv] Croff, A. G., T. F. Lomenick, R. S. Lowrie, and S. H. Stow, 2003, Evaluation of Five Sedimentary Rocks Other than Salt for Geologic Repository Siting Purposes Volume 1: Main Report, Oak Ridge National Laboratory, ORNL/TM-2003/256/V1.

[xv] Ibid. The report also includes the results of a survey of foreign activities concerning sedimentary rocks other than salt that disclosed that only shale-like rocks were being seriously considered. Shales and/or clays (along with granite) were the geologic media of choice in Belgium, Italy, and Japan. Shales and clays were considered to be alternatives in France, England, and Canada. Clays were also being considered in virtually every country for use as backfill material.

[xvi] Office of Civilian Radioactive Waste Management Fiscal Year 2002 Annual Report to Congress, DOE/RW-0560, page 27.

INTENTIONALLY LEFT BLANK

DOE/RW-0596

Report to Congress on the Demonstration of the Interim Storage of Spent Nuclear Fuel from Decommissioned Nuclear Power Reactor Sites

December 2008

U.S. Department of Energy
Office of Civilian Radioactive Waste Management
Washington, D.C.

The picture on the cover is the Connecticut Yankee Independent Spent Fuel Storage Installation site in Haddam, Connecticut, with 43 dry storage NRC-licensed dual-purpose (storage and transport) casks.

EXECUTIVE SUMMARY

The House Appropriations Committee Print that accompanied the Consolidated Appropriations Act, 2008, requests that the U.S. Department of Energy (the Department):

> ...develop a plan to take custody of spent fuel currently stored at decommissioned reactor sites to both reduce costs that are ultimately borne by the taxpayer and demonstrate that DOE can move forward in the near-term with at least some element of nuclear waste policy. The Department should consider consolidation of the spent fuel from decommissioned reactors either at an existing federal site, at one or more existing operating reactor sites, or at a competitively-selected interim storage site. The Department should engage the 11 sites that volunteered to host Global Nuclear Energy Partnership facilities as part of this competitive process.

The Department has reviewed its authority to accept spent nuclear fuel from decommissioned commercial nuclear power reactor sites for interim storage and has concluded that it has no such currently exercisable authority. Legislation is required that would eliminate the limitations in the Nuclear Waste Policy Act of 1982, as amended, on taking commercial spent nuclear fuel for interim storage prior to the opening of the Yucca Mountain repository. In addition, in order to undertake interim storage in a timely manner, legislation would be needed: (1) to direct the Department to take spent nuclear fuel from decommissioned commercial nuclear power reactors as soon as possible; (2) to establish an expedited siting process; and (3) to authorize the Department to construct and operate the facility under its regulatory authority, or, if the facility were to be constructed and operated under a U.S. Nuclear Regulatory Commission license, to provide for an expedited siting and licensing process. Furthermore, such legislation should also provide for funding reform to ensure that the Department would have access each year to adequate funds from the Nuclear Waste Fund to carry out such activities. Reliable and sufficient funding is necessary for the simultaneous development of the Yucca Mountain repository, an interim storage facility, and transportation of spent nuclear fuel to both facilities.

The Department has concluded that, without legislation, a demonstration could not be completed in the near term and would not reduce taxpayer costs for waste disposal. Assuming expeditious resolution of a number of complex statutory, regulatory, siting, construction, and financial issues, if development were to begin in 2009, such a facility might begin operations in 2015 at the earliest and complete operations by shipping commercial spent nuclear fuel from the interim storage facility to Yucca Mountain between 2025 to 2028 at a cost of $743 million. It would increase the total system life cycle costs of the repository program under the Nuclear Waste Policy Act of 1982, as amended.

The ongoing liability associated with the Department's delay in waste acceptance (currently $11 billion, assuming that operation of the Yucca Mountain repository begins in 2020) would not be reduced in any significant way and could be increased if directing the priority acceptance of spent nuclear fuel from the ten decommissioned commercial nuclear power reactors resulted in additional litigation from contract holders with operating reactors. If Congress authorizes the Department to initiate interim storage for the consolidation of the spent nuclear fuel from decommissioned commercial nuclear power reactors and amends the interim storage siting provisions provided in the Nuclear Waste Policy Act of 1982, as amended, the Department

would consider either an existing federal site, one or more existing operating commercial nuclear power reactors, or a competitively selected interim storage site, engaging the sites that have volunteered to host Global Nuclear Energy Partnership facilities as part of the competitive process.

Authorization and funding by Congress to perform interim storage would provide the Department an option in addition to Yucca Mountain to allow the Department to begin to meet its contractual obligations with the owners of commercial spent nuclear fuel. This option could prove beneficial should Yucca Mountain experience delays due to licensing, litigation, lack of funding, or other causes, but only if the enabling legislation adequately addresses the issues discussed in this report.

CONTENTS

TABLES

Page

ACRONYMS

AEA	Atomic Energy Act
DOE	U.S. Department of Energy
GNEP	Global Nuclear Energy Partnership
HLW	high-level radioactive waste
MRS	monitored retrievable storage
MTHM	metric tons of heavy metal
NRC	U.S. Nuclear Regulatory Commission
NWF	Nuclear Waste Fund
NWPA	Nuclear Waste Policy Act
OFF	oldest fuel first
SNF	spent nuclear fuel

INTENTIONALLY LEFT BLANK

1. INTRODUCTION

This report has been produced at the request of Congress. The House Appropriations Committee Print that accompanied the Consolidated Appropriations Act, 2008, requests that the U.S. Department of Energy (the Department):

> ...develop a plan to take custody of spent fuel currently stored at decommissioned reactor sites to both reduce costs that are ultimately borne by the taxpayer and demonstrate that DOE can move forward in the near term with at least some element of nuclear waste policy. The Department should consider consolidation of the spent fuel from decommissioned reactors either at an existing federal site, at one or more existing operating reactor sites, or at a competitively-selected interim storage site. The Department should engage the 11 sites that volunteered to host Global Nuclear Energy Partnership facilities as part of this competitive process.

This report discusses the status of the commercial spent nuclear fuel (SNF) inventory in the United States, at both decommissioned and operating commercial nuclear power reactor sites; summarizes the contractual arrangement the government and utilities have under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR Part 961) (Standard Contract), related litigation, and the financial liabilities resulting from the Department's delay in performance under these contracts; provides a history of interim storage policy as it relates to commercial SNF in the United States; and identifies actions that would be necessary for the Department to develop an interim storage facility and demonstration program for commercial SNF from the decommissioned commercial nuclear power reactor sites.

2. CURRENT COMMERCIAL SNF STORAGE

There are currently 104 operating and 14 permanently shutdown commercial nuclear power reactors in the United States; four of these shutdown reactors are located at sites with other operating reactors. The other ten shutdown reactors are located at nine sites with no other nuclear operations.

For purposes of this report, the Department interprets the Congressional intent in the House Appropriations Committee Print to be the ten shutdown (decommissioned) commercial nuclear power reactors located at the nine sites with no other nuclear operations.

The SNF stored at the nine sites represents a small portion of the total SNF inventory currently stored at 72 commercial sites in the United States. An interim storage facility developed solely for the SNF from the nine sites would be significantly smaller than storage facilities previously considered as part of the federal waste management system.

2.1 COMMERCIAL SNF AT DECOMMISSIONED NUCLEAR POWER REACTOR SITES

There are currently ten decommissioned commercial nuclear power reactors located at nine sites with no other nuclear operations. Approximately 2,800 metric tons of heavy metal (MTHM) of SNF is stored on a temporary basis at these nine sites, awaiting removal by the Department for

permanent disposal. Until this SNF is removed from these nine sites, the sites cannot be fully decommissioned and made available for other purposes.

As of the end of 2007, six of the nine sites have developed independent spent fuel storage installations and placed all of their SNF into dual-purpose storage systems; one additional site is loading its SNF into dry storage during 2008. While the two remaining sites are planning for dry storage, the facilities have not yet been developed, and over 1,000 MTHM of SNF remains in pool storage at these two sites. Table 1 provides a summary of the nine sites, including the quantity and status of the SNF located at the sites. For the sites that have not yet implemented dry cask storage, one has already entered into a contract for dry storage, and for the other, the Department has estimated the number of storage casks.

As noted in Table 1, the Department estimates that all of the SNF currently located at the nine sites will be packaged in approximately 294 storage/transport cask systems. These systems utilize a sealed stainless steel canister to contain the SNF. The SNF canister and the required overpacks will be certified by the U.S. Nuclear Regulatory Commission (NRC) for storage (under 10 CFR Part 72) and transportation (under 10 CFR Part 71). These canisters, when placed in an approved transportation overpack, can be shipped directly from the utility site to an interim storage facility, where the canister would be taken from the transportation overpack and placed into a storage overpack for interim storage.

Table 1. Status of Decommissioned Commercial Nuclear Power Reactor Sites in the U.S.

Plant	State	MTHM Stored at Site	MTHM in Pool Storage	MTHM in Dry Storage	Number of Casks	DOE Estimated Casks	Total Casks (Actual Plus Estimated)	Average MTHM/Cask
Big Rock Point	Michigan	58	0	58	7	—	7	8.3
Haddam Neck	Connecticut	412	0	412	41	—	41	10.1
Humboldt Bay[a]	California	29	0	29	5	—	5	5.8
LaCrosse[b]	Wisconsin	38	38	0	5	—	5	7.6
Maine Yankee	Maine	542	0	542	60	—	60	9.0
Rancho Seco	California	228	0	228	21	—	21	10.9
Trojan	Oregon	359	0	359	34	—	34	10.6
Yankee Rowe	Massachusetts	127	0	127	15	—	15	8.5
Zion 1 & 2[c]	Illinois	1,019	1,019	0	—	106	106	9.6
TOTALS		2,813*	1,057	1,756*	188	106	294	—

NOTE: [a]Dry storage underway in 2008. Holtec canister has capacity of 80 assemblies (five canisters for the 390 assemblies).

[b]Dry storage contract entered with NAC for five NAC-MPC canisters. Dry storage schedule indicates target completion by the end of 2010.

[c]Decommissioning contract entered with EnergySolutions. Canisters estimated using FuelSolutions W21 capacity. Target schedule for completion is 2013.

DOE = U.S. Department of Energy; MPC = multipurpose canister; NAC = Nuclear Assurance Corporation.

*Totals might differ from sums of values due to rounding.

3. STANDARD DISPOSAL CONTRACTS, LITIGATION, AND FINANCIAL LIABILITIES

The Standard Contract (10 CFR Part 961) defines the terms and conditions under which the government will accept commercial SNF for disposal in a geologic repository. The Department has taken the position that, as a general matter with respect to existing reactors, it will implement the Standard Contract by taking commercial SNF in the order it was generated. If Congress enacted legislation that directed the Department to take SNF from decommissioned reactors as a limited demonstration program, the Department would assign a priority to the acceptance of the SNF from these sites, pursuant to the provision in the Standard Contract that grants the Department the discretion to take SNF from decommissioned reactors on a priority basis. As discussed in the following sections, this situation would be a change from the current Department position stated previously.

3.1 STANDARD DISPOSAL CONTRACT

Section 302(a) of the Nuclear Waste Policy Act of 1982, as amended (NWPA), authorizes the Secretary of Energy to "enter into contracts with any person who generates or holds title to high-level radioactive waste, or spent nuclear fuel." These contracts cover the acceptance of title, subsequent transportation, and disposal of such high-level radioactive waste (HLW) or SNF. The NWPA stipulates that the contracts provide for the payment of fees to the Secretary to offset the expenditures of providing these services, and specifically in Section 302(a)(5), it further requires that contracts entered into under this section provide that:

A. **following commencement of operation of a repository** [emphasis added], the Secretary shall take title to the high-level radioactive waste or spent nuclear fuel involved as expeditiously as practicable upon the request of the generator or owner of such waste or spent fuel; and

B. in return for the payment of fees established by this section, the Secretary, beginning not later than January 31, 1998, will dispose of the high-level radioactive waste or spent nuclear fuel involved as provided in this subtitle.

In 1983, the Department promulgated the provisions in a disposal contract through notice and comment rulemaking. The resulting contract, known as the Standard Contract, can be found at 10 CFR 961.11.

Priority for Waste Acceptance—In addition to the provisions required by the NWPA, the Standard Contract also contains provisions that establish the responsibilities of the parties, the terms for payment, and the processes and procedures for the transfer of title and physical possession of the HLW and SNF from the utility company to the federal government. In particular, the Standard Contract establishes the process for allocating the federal government's finite waste acceptance capacity among the various utility purchasers.

This waste acceptance allocation, also known as the acceptance queue, is developed in accordance with the principle of "oldest fuel first" (OFF). Under the OFF methodology, the oldest SNF, as measured from the date of permanent discharge from the reactor, is given the highest priority in the acceptance queue. This approach ensures that all SNF, regardless of

location or ownership, is afforded equal treatment in establishing waste acceptance priority. Using the OFF methodology to allocate the Department's planned waste acceptance capacity, the last SNF shipment from the ten decommissioned commercial nuclear power reactors considered in this report would be 15 years after the repository begins operations.

The contract allows the OFF queue to be altered under certain conditions with Department consent. For instance, utility companies may, subject to Department approval, exchange places in the waste acceptance queue. Additionally, the Department may alter the queue by granting priority acceptance in cases of emergencies or by permitting priority acceptance of the SNF from reactors that have permanently ceased operations (decommissioned reactors).

The Department has been asked, on numerous occasions, to exercise its discretion under the Standard Contract to allow for the priority acceptance of SNF from decommissioned reactors. In all instances, the Department has declined to grant this priority, noting that doing so would, because of the finite nature of the federal government's planned waste acceptance capacity, adversely affect the timely removal of SNF from operating reactor sites. In other words, acceleration in waste acceptance from a decommissioned reactor site would result in a corresponding delay in removing SNF from an operating reactor site. Because of issues of equity that may result from this reallocation of waste acceptance capacity, the government has consistently advised the parties seeking such priority treatment to avail themselves of the exchange provisions of the Standard Contract that allow the utilities to exchange approved delivery commitments subject to the Department's approval.

3.2 CURRENT LITIGATION RELATED TO THE STANDARD CONTRACT

Because the Department has had no facility available to receive SNF under the NWPA, it has been unable to begin accepting SNF as required by the Standard Contracts. Significant litigation has ensued as a result of this delay. The Federal Circuit Court in the cases Northern States Power Co. v. U.S., 224 F.3d 1361 (Fed. Cir. 2000) and Maine Yankee Atomic Power Company v. United States, 225 F.3d 1336 (Fed. Cir. 2000) found the Department to be in partial breach of its contracts and found that utilities are entitled to recover damages for that breach. To date, more than 70 lawsuits have been filed, and more than 50 lawsuits remain pending against the government for delay damages.

Between 1998 and 2004, all ten decommissioned reactor utilities filed cases against the government for its delay. Claims for two of the decommissioned reactor utilities have been settled, and claims for the other eight decommissioned reactor utilities remain pending either in the U.S. Court of Federal Claims (trial courts) or in the U.S. Court of Appeals for Federal Circuit (appellate court). The government has appealed trial court damage awards of approximately $226 million for five decommissioned reactors, but no final rulings have been issued in those cases.

3.3 FINANCIAL LIABILITIES DUE TO DELAY IN WASTE ACCEPTANCE

The government has settled claims with utilities covering 29 of the 118 operating and decommissioned reactors, nearly 25 percent of the commercial nuclear power reactors covered by Standard Contracts. If the Department begins to accept SNF by 2020, the Department

estimates that the federal government's liability for delay damages may be up to approximately $11 billion. For each additional year of delay, the Department estimates that there may be hundreds of millions of dollars of additional damages.

As discussed in Section 2.1, seven of the nine decommissioned nuclear power reactor sites have already constructed interim storage facilities at the reactor sites and deployed dry cask storage systems for their entire SNF inventory. In most cases the government will be responsible for a portion of the costs incurred at these sites due to the Department's failure to begin accepting SNF in 1998, and those costs will be paid from the Judgment Fund. Accepting SNF from decommissioned reactors is unlikely to have any effect on the amount of damages unless the legislation that established the limited demonstration program was to make the elimination or reduction of damages a condition of participation.

Because most of the ten decommissioned reactors have already incurred costs for their onsite storage facilities, a limited demonstration program to remove the SNF from these sites to an interim storage facility would not significantly change the estimated overall liability of $11 billion. At the same time, directing the priority acceptance of SNF from the ten decommissioned reactors would likely result in additional litigation from contract holders with operating reactors, as well as in demands for acceptance of their SNF at an interim storage facility.

4. HISTORY OF INTERIM STORAGE POLICY IN THE U.S.

This section provides a review of the history of interim storage policy to date. The Department has under certain circumstances accepted commercial SNF under the authority of the Atomic Energy Act of 1954 (AEA) (42 U.S.C. 2011 et seq.). The NWPA, however, severely limits the Department's authority to accept such SNF for interim storage.

4.1 DOE AUTHORITY TO ACCEPT SNF UNDER THE ATOMIC ENERGY ACT OF 1954

Prior to the enactment of the NWPA in 1982, the Department had authority and continues to have authority to accept SNF in certain circumstances pursuant to the AEA. Section 55 of the AEA, as amended (42 U.S.C. 2075), provides that the Department "is authorized, to the extent it deems necessary to effectuate the provisions of [the Act], to purchase, ... take, requisition, condemn, or otherwise acquire any special nuclear material or any interest therein." The authority under the AEA may be exercised to further any of its purposes, including international cooperation and nuclear nonproliferation, support of research and development in nuclear power, and management of the U.S. nuclear defense programs (42 U.S.C. 2111, 42 U.S.C. 2112, 42 U.S.C. 2013, 42 U.S.C. 2051(a), and 42 U.S.C. 2152).

Pursuant to this AEA authority, the Department has accepted and stored U.S.-supplied foreign reactor fuel at various DOE sites. The Department has also used this authority to accept small amounts of SNF for research and development purposes, such as parts of the Three Mile Island Unit 2 damaged reactor core and other damaged SNF. The Department has also accepted commercial SNF under settlement of disputes resulting from contracts that predate enactment of the NWPA.

However, the later-enacted NWPA provided a detailed statutory scheme for SNF storage and disposal and limited the Department's authority to accept SNF under the AEA except in compelling circumstances such as acceptance of SNF to abate a public health risk in an emergency. For the Department to accept any commercial SNF under the AEA, the Department could do so only under certain circumstances determined to be identifiable exceptions in the AEA like those discussed previously. In the absence of statutory direction to accept SNF from decommissioned reactors that explicitly addressed the limitations imposed by the NWPA, the Department does not believe that the acceptance of the SNF from the ten decommissioned reactors considered in this report would be permitted under an identifiable exception in the AEA.

4.2 DOE AUTHORITY UNDER THE NUCLEAR WASTE POLICY ACT OF 1982

With enactment of the NWPA, Congress provided a detailed statutory scheme for commercial SNF storage and disposal that, by its specificity, limits the Department's commercial SNF storage and disposal options as follows.

The NWPA permits the Department to undertake interim storage in two distinct instances, descriptions of which follow, neither of which can currently be exercised.

First, Section 135 of the NWPA (Subtitle B—Interim Storage Program) authorized the Department to enter into contracts to assist or provide temporary storage, known as federal interim storage, for a limited amount of SNF under certain specified conditions (including a separate fee) until a repository was available. This authority expired in 1990.

Second, Section 141 of the NWPA (Subtitle C, Monitored Retrievable Storage), authorized the Department to site, construct, and operate a monitored retrievable storage (MRS) facility but restricted the ability of the Department to pursue this option by linking any activity under this section to milestones tied to progress in the development of the Yucca Mountain repository (42 U.S.C. 10155 to 42 U.S.C. 10157). For example, before the MRS can be constructed, the NRC must have issued a construction authorization for the Yucca Mountain repository; and until the Yucca Mountain repository starts accepting SNF, the quantity of SNF stored at the MRS site cannot exceed 10,000 MTHM. After the Yucca Mountain repository starts accepting SNF, the total quantity of SNF at the MRS site cannot exceed 15,000 MTHM at any one time. Additionally, the NWPA stipulated that the MRS cannot be located in the State of Nevada.

In 1994, in an effort to consider all available avenues to accept commercial SNF, the Department issued a Notice of Inquiry on Waste Acceptance Issues seeking public comment on, among other issues, whether the Department had statutory authority under the NWPA to provide interim storage of SNF (59 FR 27007). In the subsequent 1995 final report responding to public comments, the Department determined again that the NWPA explicitly contemplated interim storage in only two instances: interim storage under Section 135 of the NWPA and an MRS under Section 141 of the NWPA (Office of Civilian Radioactive Waste Management; Nuclear Waste Acceptance Issues, 60 FR 21793). However, the report also noted that *the interim storage provision had expired and the MRS provisions were unusable because of the required linkages to repository development.* The report concluded that because neither of the NWPA's explicit interim storage authorities applied and because the NWPA precluded the Secretary from spending Nuclear Waste Fund (NWF) monies for construction or expansion of a facility without

express authorization from Congress, the Department lacked authority at that time to provide interim storage under existing law. Specifically, the report stated the following:

> Interim storage by DOE was contemplated by the Act in only two situations, neither of which currently applies. Under the Act, DOE had authority to offer a limited interim storage option. See 42 U.S.C. 10156. However, that authority has, by its express terms, expired. Under the Act, DOE also has the authority to provide for interim storage in an MRS. That authority also is inapplicable, however, because the Act ties construction of an MRS to the schedule for development of a repository. See 42 U.S.C. 10165, 10168. Because these are the only interim storage authorities provided by the Act, and because the Act expressly forbids use of the Nuclear Waste Fund to construct or expand any facility without express congressional authorization (42 U.S.C. 10222(d)), *DOE lacks authority under the Act to provide interim storage services under present circumstances.* (60 FR 21793; emphasis added)

In addition, whether or not the Department can begin accepting SNF from commercial utilities prior to receiving construction authorization for the Yucca Mountain repository has been one of the issues litigated by contract holders. No court has found that the Department has authority under the NWPA to accept SNF from commercial utilities at this time.

For these reasons, the Department believes that any statutory direction to begin accepting SNF from decommissioned reactors would also need to address the limitations on the current exercise by the Department of its authority under the AEA to accept commercial SNF, as discussed earlier in this section.

5. PREREQUISITES FOR A LIMITED DEMONSTRATION OF INTERIM STORAGE OF SNF FROM NINE DECOMMISSIONED NUCLEAR POWER REACTOR SITES

The Department has identified a number of issues that would need to be addressed in any legislation that would direct the Department to begin accepting SNF from decommissioned reactors in order for the Department to have the ability to implement such direction in a timely and efficient manner. As noted previously, the limitations in the NWPA on the current exercise by the Department of its authority under the AEA to accept commercial SNF would need to be rendered inapplicable to SNF from decommissioned reactors. In addition, the Department has concluded that the existing provisions in the NWPA relating to interim storage would not result in the timely and efficient implementation of statutory direction to begin accepting SNF from decommissioned reactors because of the length of time and the potential of the state to veto the site under the existing provision of the NWPA. To proceed in a timely manner, the Department would require legislation to (1) direct the Department to take SNF from decommissioned reactors as soon as possible under its AEA authority; (2) establish an expedited siting process; and (3) authorize the Department to construct and operate the facility under its own regulatory authority, or, if the facility were to be constructed and operated under an NRC license, to provide for an expedited licensing process. Moreover, to be effective, any legislation would need to include funding reform to ensure that the Department has prompt access to the annual fees and interest paid into the NWF so that the Department could undertake its obligations to construct both the interim storage facility and the Yucca Mountain repository in a timely and efficient manner and thereby fulfill its commitments to all contract holders.

5.1 AUTHORITY

Because of the limitations on the current exercise of the Department's authority under the AEA, any legislation would need to make those limitations inapplicable to SNF from decommissioned commercial nuclear power reactors. In addition, to minimize the potential for further litigation from other contract holders, the legislation would likely need to expressly direct the Department to exercise its discretionary authority under the Standard Contract to take SNF from the decommissioned reactors on a priority basis as part of a statutorily mandated limited demonstration program.

5.2 SITING PROCESS

The Department has concluded that timely and efficient implementation of a limited demonstration program would also require establishment of a new statutorily mandated expedited siting process, rather than use of the existing siting processes in Subtitles B and C of the NWPA.

5.2.1 Existing Interim Storage Siting Requirements under the NWPA

Under Subtitle B, Interim Storage Program, the Department was authorized to (1) assist or provide temporary interim storage at government facilities, (2) provide for the acquisition of temporary storage casks for federal or civilian nuclear sites, or (3) construct storage capacity at any civilian nuclear power site. This subtitle expired in 1990.

Under Subtitle C, Monitored Retrievable Storage, the Department is authorized to site, design, and license a storage facility. The Department cannot construct the facility, however, until the Department has received a construction authorization from the NRC for the Yucca Mountain repository. In addition, Section 145 of the Act also prohibits the Secretary from selecting a site that is located in the State of Nevada. The MRS Commission was established pursuant to Section 143 of the NWPA and delivered its report to Congress in 1989. The Department recommended the Yucca Mountain site for the development of a repository in 2002. The Department could proceed with the siting of an interim storage facility in accordance with the requirements of Sections 144 through 146 of the NWPA. Section 144 requires the Secretary to survey and evaluate potentially suitable sites. From a technical standpoint, such a facility could be successfully developed virtually anywhere in the nation, other than Nevada; however, as specifically stated in Section 144, the NWPA limits the Secretary's consideration stating that the Secretary shall consider the extent to which siting an MRS facility would:

1. Enhance the reliability and flexibility of the system for the disposal of spent nuclear fuel and high-level radioactive waste established under this Act;

2. Minimize the impacts of transportation and handling of such fuel and waste;

3. Provide for public confidence in the ability of such system to safely dispose of the fuel and waste;

4. Impose minimal adverse effects on the local economy and the local environment;

5. Provide a high probability that the facility will meet applicable environmental, health, and safety requirements in a timely fashion;

6. Provide such other benefits to the system for the disposal of spent nuclear fuel and high-level radioactive waste as the Secretary deems appropriate; and

7. Unduly burden a State in which significant volumes of high-level radioactive waste resulting from atomic energy defense activities are stored.

Upon completion of the site surveys, the Secretary can select a site in accordance with the provisions of Section 145 of the NWPA. The Secretary may select a site from the sites evaluated under Section 144 that the Secretary determines on the basis of available information to be the most suitable for the development of an interim storage facility that is an integral part of the system for the disposal of SNF and HLW. The Secretary shall also prepare an environmental assessment with respect to such a selection and shall submit the environmental assessment to Congress at the time the site is selected.

Additionally, at least six months before selecting a site, the Secretary must notify the governor and legislature of the state in which the site is located (or the governing body of the affected Indian tribe where such site is located) of the potential selection and the basis for such selection. At least one public meeting must be held in the vicinity of the potential site to solicit input from interested parties. Section 145 also prohibits the Secretary from selecting a site that is located in the State of Nevada.

Once the Secretary notifies Congress of the selection of a site, the selection is effective at the end of 60 calendar days from the date of Congressional notification, unless the governor and state legislature (or the governing body of the affected Indian tribe if the site is located on a reservation) have submitted to Congress a notice of disapproval with respect to the site. If a notice of disapproval is received, the selection of the site is not effective unless Congress overrides the notice of disapproval as provided under Section 115(c) of the NWPA.

The NWPA also stipulates the amount of financial assistance (grants, technical assistance, and other financial assistance) that the Department can provide the host state of the interim storage facility. This amount includes benefit payments of $5 million per year prior to the start of storage facility operations and $10 million per year thereafter.

5.2.2 Possible Expedited Siting Process

The Department has concluded that in order to allow for the timely implementation of an interim storage facility, the siting process for the interim storage facility for the demonstration program, to a very large extent, would need to follow the process that would be utilized for siting a commercial away-from-reactor storage facility. That is, there should be (1) no special provisions that link the siting, construction, or operation to events related to the Yucca Mountain repository; (2) no provisions for Presidential or Congressional involvement in approval of the site; and (3) no provisions for a veto. In addition, the siting process would be facilitated if substantial benefit payments were potentially available to the host state.

5.2.3 POTENTIAL LOCATIONS

As requested by Congress, the Department has considered the consolidation of the SNF from decommissioned reactors at an existing federal site, at one or more existing operating reactor sites, or at a competitively selected interim storage site, including sites that volunteered to host Global Nuclear Energy Partnership (GNEP) facilities as part of this competitive process. It is likely that state or local governments at or around the host site would impose limitations on the interim storage facility, such as a capacity limit to prevent the site from future expansion beyond an agreed-upon capacity or a financial penalty if the SNF is left in place and not removed to the Yucca Mountain repository within a specified time period.

5.2.3.1 Existing Federal Site

An interim storage facility could be developed at a DOE site or at many other federal sites. The Department's sites at Savannah River, Hanford, and Idaho possess existing infrastructures, including security programs for SNF, operational and regulatory expertise, fully developed environmental baselines, and rail access that would facilitate acceptance. The Idaho National Engineering Laboratory site may present some unique issues due to prior agreements between the Department and the State of Idaho regarding the acceptance of commercial SNF.

5.2.3.2 One or More Existing Operating Reactor Sites

The Department could solicit expressions of interest for the consolidation of SNF from decommissioned reactors at one or more operating reactor sites. If an existing NRC-licensed site were chosen, it would be necessary to develop the interim storage facility under NRC licensing requirements. Under current NRC regulations, the reactor operators are licensed to possess quantities of SNF only as required to operate their reactors. Accepting SNF from decommissioned reactors at an operating reactor site would require a modification to the operating reactor's NRC license. This process may require hearings that could be contentious, thus delaying acceptance. Like the Department's sites, existing reactor sites have fully developed nuclear infrastructures and environmental baselines.

5.2.3.3 Competitively Selected Interim Storage Site

The Department could broadly solicit expressions of interest for the development an interim storage site for the SNF from the decommissioned reactors. This effort could build upon recent Department efforts in developing site characterization reports for eleven potential sites as part of the Department's GNEP program and other industry initiatives. As with the GNEP siting effort, the competitive process for selection of an interim storage facility should have the benefit of identifying a willing and supportive host. The sites may or may not have an existing nuclear infrastructure, and they could require more time for development and establishment of an environmental baseline. It should be noted, however, that local willingness and support for a site initially does not ensure continued support for the facility during the long timeframe needed to license and build such a facility.

5.3 LICENSING AND ENVIRONMENTAL REVIEW

Under Section 202 of the Energy Reorganization Act of 1972, any Department facility used primarily for the interim storage of commercial SNF must be licensed by the NRC. Information obtained from the NRC Web site indicates that the development of SNF storage facilities at nuclear power reactor sites typically takes up to three years from the decision to implement through operation.[1] The NRC review of the Private Fuel Storage license application for a proposed interim storage facility in Utah, which encountered significant public opposition, took over eight years. Since the SNF currently in storage at the nine decommissioned reactor sites is stored in six different types of storage systems, the license application for the interim storage facility would have to address the use of all these types of storage systems, and would be, therefore, more complex than the license application for existing facilities, which each use only one type of storage system.

Construction and operation of the interim storage facility would be expedited if the Department were authorized to use its authority under the AEA to regulate the facility. Alternatively, if the NRC were to license the facility, the NRC should be directed to use an expedited licensing process such as making use of the existing general license for certain interim SNF storage facilities. In addition, the NRC should be directed by statute to adopt DOE National Environmental Policy Act of 1969 (42 U.S.C. 4321) documents for the interim storage facility in a manner similar to the current approach in the NWPA, with respect to the environmental impact statement for the Yucca Mountain repository. Furthermore, as in the case for SNF that will be transported to the Yucca Mountain repository, the Department and not the NRC should be responsible for regulating the transportation of SNF to the interim storage facility.

5.4 CONSTRUCTION, TRANSPORTATION, AND OPERATIONS

Construction of the interim storage facility would be expedited if the interim storage facility were located at a site with existing nuclear infrastructure, rail transportation, and security services. At such a site, the required facilities would include a simplified canister receipt facility that could be utilized to remove the storage canisters from the transportation cask system and place them in appropriate onsite storage overpacks, an overpack fabrication facility for the onsite fabrication of the storage overpacks, an onsite transporter for transporting the loaded storage systems from the canister receipt facility to the storage pads, and one or more reinforced concrete storage pads. Based on experience at commercial nuclear facilities, the construction of these facilities could be completed in 12 to 24 months, assuming adequate funding, the issuance of all necessary permits, no linkage of construction to events related to the Yucca Mountain repository, and the absence of litigation-related delays.

Transportation—For the purpose of this report, the Department has developed an illustrative waste acceptance schedule for the acceptance of the SNF from the nine decommissioned reactor

[1] http://www.nrc.gov/waste/spent-fuel-storage/sf-storage-licensing/license-considerations.html

sites. To expedite acceptance in the near term, the Department has developed this schedule based on an approach that focuses on efficiency in transporting the SNF to the interim storage facility and does not follow the notification and scheduling requirements contained in the Standard Contracts. As shown in Table 2, the schedule presumes that all the SNF is removed from the nine decommissioned reactor sites in a period of four years.

Table 2. Waste Acceptance Schedule for the Acceptance of the SNF from the Nine Decommissioned Commercial Nuclear Power Reactor Sites

Shipping Schedule	MTHM	Shipments/Year
Year 1	400	46
Year 2	600	57
Year 3	794	85
Year 4	1,019	106
TOTAL	2,813	294

NOTE: The waste acceptance schedule does not consider technical attributes, such as the condition of the commercial SNF, that could affect the order and timing in which the Department could accept SNF for disposal.

SNF = spent nuclear fuel.

To implement transportation in accordance with this schedule, the Department would need to acquire more than 20 NRC-certified transportation casks and associated equipment, including rail rolling stock. While the number of casks required may appear high for such a small inventory of SNF, it is because the SNF at the seven decommissioned reactor sites with existing dry storage facilities is stored in six different types of SNF storage systems, each requiring a specific type of transportation cask system.

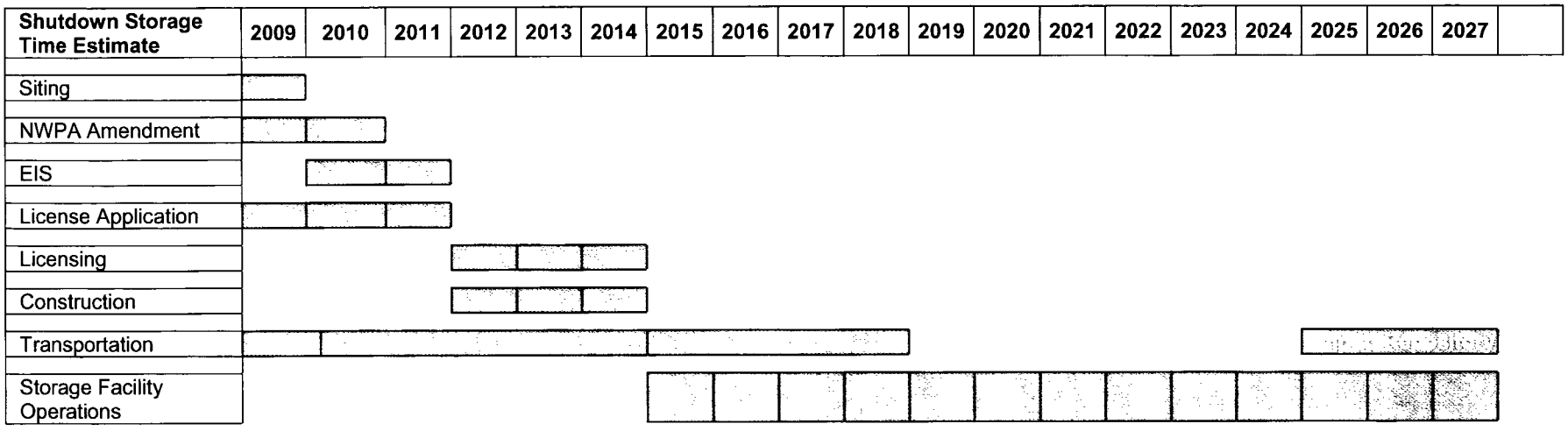
Operations—It is anticipated that the Department would store the SNF in NRC-approved storage systems in the same manner that the SNF is currently stored at the decommissioned reactor sites. As noted previously, this action would require the acquisition of six different types of storage systems and associated handling equipment. If the site is adjacent to an existing nuclear facility, utilization of the existing operational infrastructure would minimize cost and time before start-up.

5.5 FUNDING

5.5.1 Project Cost and Schedule

The Department has developed a preliminary cost estimate and schedule for the development and operation of an interim storage facility, if authorized by Congress, designed to accept and store the approximately 2,800 MTHM of SNF from the nine decommissioned reactor sites (Table 3). Table 3 shows that if successfully developed, under the assumptions discussed previously, such an interim storage facility could be developed to begin operations in 2015 at the earliest and to operate through 2028 at a cost of $743 million. The schedule and estimate assume that the site selected has a preexisting nuclear infrastructure, adequate funding, adequate rail access and an expedited site selection process with no opposition or litigation. Once accepted at the interim storage facility, the SNF would remain on site until it could be delivered to the Yucca Mountain repository without adversely impacting the acceptance of SNF from operating reactors.

Table 3. Estimated Cost and Schedule for Interim Storage of SNF from Decommissioned Nuclear Power Reactors Sites



Shutdown Storage Cost Estimate	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Siting	$10																			$10
EIS/LA/ Licensing		$4	$6	$4	$4	$2	$0													$20
Storage Facility Construction				$4	$6	$10														$20
Storage Overpacks						$12	$19	$25	$32											$88
Transportation Equipment						$72	$72													$144
Transportation Operations							$12	$19	$25	$32							$29	$29	$29	$176
Storage Facility Operations							$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$130
Site Benefits NWPA Sec.171		$5	$5	$5	$5	$5	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10	$155
Total	$10	$9	$11	$13	$15	$101	$123	$64	$77	$52	$20	$20	$20	$20	$20	$20	$49	$49	$49	$743

NOTE: The waste acceptance schedule does not consider technical attributes, such as the condition of the commercial SNF, that could affect the order and timing in which the Department could accept it for disposal. This estimate also assumes enactment of all necessary legislation, optimal project funding, the issuance of all necessary authorizations and permits, and the absence of litigation-related delays.

EIS = environmental impact statement; LA = license application; NWPA = Nuclear Waste Policy Act of 1982, as amended; SNF = spent nuclear fuel.

5.5.2 Legislative Funding Reform

In the absence of statutory language that authorizes the use of the NWF, the Department expects that the use of any funds from the NWF for a limited demonstration program would be subject to challenge. Thus, any legislation should make clear that construction and operation of the interim storage facility is an authorized use of the NWF.

In addition, in order to provide for the timely and efficient construction and operation of both the interim storage facility and the Yucca Mountain repository, any legislation should include funding reform that ensures that the Department has prompt access to annual fees and interest deposited in the NWF. In the absence of funding reform, interim storage costs would be part of the Department's budget allocation, which would exacerbate the existing problem of competing for limited resources within the Department's budget allocation. Without funding reform, Congressional appropriators and the administration would need to prioritize each year between other Department activities, Yucca Mountain repository efforts, and the development of an interim storage facility for the acceptance of SNF from the nine decommissioned reactor sites.

Legislation providing direction for interim storage without funding reform would further jeopardize the Yucca Mountain project and increase taxpayer liability. Regardless of whether direction is given to begin accepting SNF from decommissioned reactors, the liability costs incurred by the Department's delay under the Standard Contract will increase for every year that the repository is delayed.

5.5.3 Impact on the Adequacy of the Fee

The inclusion of the development and operations of an interim storage facility for the SNF from decommissioned reactors would increase the total system life cycle costs of the repository program under the NWPA. A new fee adequacy assessment would need to be conducted to assess whether the additional near-term costs of an estimated $743 million would have an impact on the nuclear waste disposal fee. The program would be required to construct both an interim storage facility and a repository simultaneously, resulting in significantly higher near-term expenditures.

The adequacy of the fee is based on sufficient investment accumulation for the repository out-year needs after fee revenue is no longer provided to the government. Near-term increases in funding requirements could result in a negative impact on the adequacy of the 1 mill per kilowatt hour fee currently paid by utilities.

6. CONCLUSION

The Department has reviewed its authority to accept SNF from decommissioned nuclear power reactor sites for interim storage and has concluded that it has no such currently exercisable authority. Legislation is required that would eliminate the limitations in the NWPA on taking commercial SNF for interim storage prior to the opening of the Yucca Mountain repository. In addition, in order to undertake interim storage in a timely and efficient manner, legislation would be needed (1) to direct the Department to take SNF from decommissioned nuclear power reactors as soon as possible; (2) to establish an expedited siting process; and (3) to authorize the Department to construct and operate the facility under its regulatory authority, or, if the facility

were to be constructed and operated under an NRC license, to provide for an expedited siting and licensing process. Furthermore, legislation should also provide for funding reform to ensure the Department access each year to the additions to the NWF from fees and interest. Reliable and sufficient funding is necessary for the simultaneous development of the Yucca Mountain repository and an interim storage facility.

While moving the SNF from the nine decommissioned commercial nuclear power reactor sites would demonstrate that the Department can move forward prior to the opening of the repository, any reduction in the Department's liability for failing to begin accepting commercial SNF in 1998 would be minimal. The ongoing liability associated with the Department's delay in waste acceptance (currently $11 billion, assuming that operation of the Yucca Mountain repository begins in 2020) would not be reduced in any significant way and could be increased if providing priority acceptance of the SNF from the nine decommissioned commercial nuclear power reactor sites resulted in additional litigation from contract holders with operating reactors, as well as in demands for acceptance of their SNF at the interim storage facility.

If Congress authorizes the Department to initiate interim storage for the consolidation of the spent nuclear fuel from decommissioned commercial nuclear power reactors and amends the interim storage siting provisions provided in the Nuclear Waste Policy Act of 1982, as amended, the Department would consider either an existing federal site, one or more existing operating commercial nuclear power reactors, or a competitively selected interim storage site, engaging the sites that have volunteered to host Global Nuclear Energy Partnership facilities as part of the competitive process.

Authorization and funding by Congress to perform interim storage would provide the Department an option in addition to Yucca Mountain to allow the Department to begin to meet its contractual obligations with the owners of commercial spent nuclear fuel. This option could prove beneficial should Yucca Mountain experience delays due to licensing, litigation, lack of funding or other causes, but only if the enabling legislation adequately addresses the issues discussed in this report.

7. REFERENCES

10 CFR (Code of Federal Regulations) Part 71. Energy: Packaging and Transportation of Radioactive Material.

10 CFR Part 72. Energy: Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste.

10 CFR Part 961. Energy: Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste.

59 FR 27007. Notice of Inquiry on Waste Acceptance Issues.

60 FR 21793. Office of Civilian Radioactive Waste Management; Nuclear Waste Acceptance Issues.

Atomic Energy Act of 1954. 42 U.S.C. 2011 et seq.

Atomic Energy Act of 1954, as amended. 42 U.S.C. 2075 et seq.

Consolidated Appropriations Act, 2008. Public Law No. 110-161. 121 Stat. 1844.

Construction Authorization. 42 U.S.C. 10168 et seq.

Domestic Distribution. 42 U.S.C. 2111 et seq.

Energy Reorganization Act of 1972.

Findings and Purposes. 42 U.S.C. 10131 et seq.

Foreign Distribution of Byproduct Material. 42 U.S.C. 2112 et seq.

Interim Storage Fund. 42 U.S.C. 10156 et seq.

National Environmental Policy Act of 1969. 42 U.S.C. 4321 et seq.

Nuclear Waste Fund. 42 U.S.C. 10222 et seq.

Nuclear Waste Policy Act of 1982. 42 U.S.C. 10101 et seq.

Policies Contained in International Arrangements. 42 U.S.C. 2152 et seq.

Purpose of Chapter. 42 U.S.C. 2013 et seq.

Research and Development Assistance. 42 U.S.C. 2051 et seq.

Site Selection. 42 U.S.C. 10165 et seq.

Storage of Spent Nuclear Fuel. 42 U.S.C. 10155 et seq.

Transportation. 42 U.S.C. 10157 et seq.

U.S. Congress. House. Committee on Appropriations. *Consolidated Appropriations Act, 2008.* 110th Cong., 1st sess., 2008. Committee Print.

INTENTIONALLY LEFT BLANK